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GLOSSARY OF RECLAMATION AND REMEDIATION TERMS USED IN ALBERTA

6TH EDITION

Alberta
ENVIRONMENT

INTRODUCTION

This glossary was originally prepared at the request of the Reclamation Research Technical Advisory Committee (RRTAC) to provide people working in the field of reclamation in Alberta with a standardized set of definitions for reclamation terms. Use of these standardized terms will help improve understanding of plans, criteria, guidelines, and research proposals and results.

The references have been taken from a wide variety of sources. Primary sources (original glossaries) have been quoted as much as possible. For soils terms, the *Glossary of Terms in Soil Science* (Canada Department of Agriculture, Research Branch, 1976) has been used as the primary reference. Wherever possible, Alberta-based definitions have been included.

The definitions are laid out as follows:

1. The term being defined **in bold**.
2. Similar or related terms cross-referenced in the glossary in *italics*.
3. The definition. In some cases, there are multiple parts to a definition; these are shown as (1), (2) etc. In other cases, there is more than one definition given.

The first definition is the one most commonly used in Alberta. Some definitions are from regulatory documents (Acts, regulations) and are labeled as such.

UPDATES

This edition has been re-titled to reflect the reclamation and decommissioning/remediation mandate of the Land Management Program. Additional material has been added from recent oil sands and native revegetation publications as well as the Canadian Association of Petroleum Producers' website (www.capp.ca) and Alberta Energy and Utilities Board publications.

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COMMENTS AND SUGGESTIONS

Comments on existing definitions and suggestions for new ones are welcome. Where possible please supply a reference for new definitions.

Please send comments and suggestions to land.management@gov.ab.ca or fax to Chris Powter at (780) 422-4192.

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A

A Horizon *B Horizon/C Horizon*

A mineral horizon formed at or near the surface in the zone of removal of materials in solution and suspension, or maximum *in situ* accumulation of organic carbon, or both.

Abandoned Mine *Derelict Land*

A mine where mineral or ore is no longer being extracted and it is the intent of the operator not to continue extraction from the site.

Abandonment *Suspension*

The permanent dismantlement of a facility so it is permanently incapable of its intended use. This includes the removal of associated equipment and structures.

Converting a drilled well to a condition that can be left indefinitely without further attention and without damaging fresh water supplies or potential petroleum reservoirs.

Abundance

The number of organisms per unit area or volume.

Abundance-dominance *Presence-Absence*

The number of individuals of a plant species and their coverage in a phytosociological survey. The scale generally used is that of J. Braun-Blanquet from which stemmed many variations. It is based on the coverage of individuals for classes with coverage higher than 5% and on the abundance for classes with a lower percentage;

Acceptable Risk *Risk/Safety*

A risk which is so small, whose consequences are so slight, or whose associated benefits (perceived or real) are so great, that persons or groups in society are willing to take or be subjected to that risk.

Acid Soil *Alkaline Soil/pH*

Soil of pH less than 7.0.

Accuracy *Precision*

The closeness of a measured or computed value to its true value

The agreement between the measured value and the accepted or "true" value.

Actinomycetes *Mycorrhiza*

Unicellular filamentous microorganisms that branch monopodially or more rarely dichotomously and form radiating colonies; mainly found in the soil, and cause of its characteristic odour.

Active Ingredient (a.i.)

The chemical component(s) in a product or formulation that causes the effect.

Acute *Chronic*

With reference to toxicity, having a sudden onset, lasting a short time (usually within hours or days). With reference to a stimulus, severe enough to rapidly induce a response.

Adaptive Management

A management approach that involves the monitoring and evaluation of a reclaimed area's performance followed by any necessary actions to achieve the intended performance objectives. Adaptive management also allows information to be fed back into the planning and design process so that future reclaimed areas will meet the intended objectives.

A tenet of ecological management, in which human resource users are flexible to change the way they interact with the environment, based upon need and the availability of new information

Adhesion *Cohesion*

Molecular attraction that holds the surfaces of two dissimilar substances in contact, such as water and soil particles.

Adsorption

The surface retention of solid, liquid, or gas molecules, atoms, or ions by a solid or liquid surface.

Aeration

Any process where a substance or substrate becomes permeated with air or another gas. The term generally applies to aqueous liquids being brought into intimate contact with air by spraying, bubbling or agitating the liquid.

Aeration (soil)

The process by which air in the soil is replaced by air from the atmosphere. In a well-aerated soil, the soil air is similar in composition to the atmosphere above the soil. Poorly aerated soils usually contain a much higher percentage of carbon dioxide and a correspondingly lower percentage of oxygen than the atmosphere. The rate of aeration depends largely on the volume and continuity of pores from the surface and within the soil.

Afforestation *Reforestation*

The artificial establishment of forest crops by planting or sowing on land that has not previously, or not recently, grown tree crops.

Aggregate *Soil Structure*

A group of soil particles cohering so as to behave mechanically as a unit. The soil particles may be bound together by organic substances, iron oxides, carbonates, clays and/or silica. Aggregates may be spheres, blocks, plates, prisms, or columns.

Aggregate Stability

A measure of the vulnerability of aggregates to externally imposed disruptive processes. It is not measurable in absolute terms since it depends not only on the soil itself but also to a large degree upon the nature of the forces and the manner in which they are applied. Therefore, it is a relative and partly subjective concept.

Agronomic *Native Species*

A plant developed using agronomic methods (rather than a native plant).

Of or relating to the science of agronomy (the practice of field-crop production and soil management).

Air Porosity *Porosity*

The portion of the bulk volume of soil that is filled with air at any given time under a given condition such as a specified soil water potential. Usually, this portion is made up of large pores, that is those drained by a tension of less than about 100 cm (39.4 inches) of water.

Albedo

The ratio of electromagnetic radiation reflected by a surface to that absorbed, usually expressed as a percentage.

Alien *Exotic Species/Native Species*

A plant that did not originally occur in an area where it is now established, but which arrived directly or indirectly by human activity.

Alkali Soil *Saline Soil/Sodic Soil*

(1) A soil having a pH greater than 8.5 or an exchangeable sodium percentage greater than 15 or both.
(2) A soil that contains enough alkali (sodium) to interfere with the growth of most crop plants.

Alkaline Soil *Acid Soil/pH*

A soil that has a pH greater than 7.0

Allelopathic

An action or substance produced by or in one plant that inhibits or restricts the growth of another plant species. These substances most commonly include toxic organic materials produced directly by the plant, or as a result of the decomposition of plant residues.

Alluvium (Alluvial Deposit) *Colluvium/Fluvial*

Material such as clay, silt, sand and gravel deposited by modern rivers and streams.

Amendment (soil)

(1) An alteration of the properties of a soil, and thereby of the soil, by the addition of substances such as lime, gypsum, manure, and sawdust to make the soil more suitable for the growth of plants.
(2) Any substance used for this purpose. Technically, a fertilizer is also an amendment but the term "amendment" is used most commonly for added materials other than fertilizer.

Amorphous Peat *Peat*

The structureless portion of an organic deposit in which the plant remains are decomposed beyond recognition.

Analyte

The specific component or element measured in a chemical analysis.

Angle of Repose

Angle between the horizontal and the maximum inclination (slope) that a soil assumes through natural processes.

Anion *Cation*

An ion carrying a negative charge of electricity. The most common anion in soil is sulphate (chloride in salt water contaminated soils).

Aquatic

Growing, living in or frequenting water; occurring or situated in or on water.

Aquifer *Perched Aquifer*

Stratum or zone below the surface of the earth capable of producing water as from a well.

Aquitard

Stratum or zone below the surface of the earth that contains but cannot transmit water, e.g., clay.

Arable

Tillage; agricultural production based on cultivation practices; land that is cultivated or capable of being cultivated. Arable is used as a comparison to agriculture based on grazing (non-cultivated) systems.

Atterberg Limits

The moisture conditions of "liquid limit", "plastic limit", "plasticity index", and "shrinkage limit".

Available Plant Nutrients *Nutrient*

That portion of any element or compound in the soil that can be readily absorbed and assimilated by growing plants.

Available Water *Water Content*

The portion of water in a soil that can be readily absorbed by plant roots.

B

B Horizon *A Horizon/C Horizon*

A subsoil horizon characterized by one of:

(1) an enrichment in clay, iron, aluminum, or humus (Bt or Bf).
(2) a prismatic or columnar structure that exhibits pronounced coatings or stainings associated with significant amounts of exchangeable sodium (Bn or Bnt).
(3) an alteration by hydrolysis, reduction, or oxidation to give a change in colour or structure from the horizons above or below, or both (Bm).

Backfill *Fill*

(1) The operation of refilling an excavation.
(2) The material placed in an excavation in the process of backfilling.

Background Samples

Matrices minus the analytes of interest that are carried through all steps of the analytical procedure. They are used to provide a reference for determining whether environmental test sample results are significantly higher than "unpolluted" samples, which contain "zero", low, or acceptable levels of the analytes of interest. They are needed in order to attribute the presence of analytes of interest to pollution rather than to a natural occurrence or to a previous occurrence of the analytes of interest in the environmental matrix. All matrices, reagents, glassware, preparation, and instrumental analyses are included in the analysis of background samples.

Bank Cubic Metre

A cubic metre of material in place.

Basal Area

The area occupied by a plant near the ground surface; measured across the stem of a tree 1.5 to 1.5 m above the ground surface, or across a clump in the case of graminoids, usually 2 to 3 cm above the ground surface.

Base of Highwall *Highwall*

The point of intersection between the highwall and the place formed at the base of the excavated material.

Base Saturation Percentage *Cation Exchange Capacity*

The extent of which the absorption complex of a soil is saturated with exchangeable cations other than hydrogen and aluminum. It is expressed as a percentage of the total cation exchange capacity.

Battery

Equipment to process or store crude oil from one or more wells.

Bearing Capacity

The average load per unit area that is required to rupture a supporting soil mass.

Bedrock

The solid rock that underlies soil and the regolith or that is exposed at the surface.

Bedrock Spoil *Mine Dump/Spoil*

Bedrock material that has been mined and dumped. It may consist of hard fragments of varying size or may be soil-sized particles.

Bentonite

A type of mineral deposit consisting principally of montmorillonite clay. (A major constituent of drilling muds.)

Berm

A mound or wall of earth. Used to retain substances or to prevent substances from entering an area.

Bioaccumulation *Bioconcentration/Biomagnification*

A widespread term that describes a process by which chemical compounds are taken up by terrestrial and aquatic organisms from the medium directly and through the consumption of contaminated food.

Bioassay

The use of an organism or part of an organism as a method for measuring or assessing the presence or biological effects of one or more substances under defined conditions. A bioassay test is used to measure a degree of response (e.g., growth or death) produced by exposure to a physical, chemical or biological variable.

Bioavailability

The amount of chemical which is actually available to the target tissues following exposure.

Bioconcentration *Bioaccumulation/Biomagnification*

A widespread term that describes the process by which contaminants are directly taken up by terrestrial and aquatic organisms from the medium.

Biodegradable

Able to be decomposed, as a result of the action of microorganisms such as bacteria. Materials are considered biodegradable if they decompose relatively quickly.

Biodegradation

The process of destruction or mineralization of either natural or synthetic materials by the microorganisms of soils, waters, or wastewater treatment systems.

Biodiversity

Totality of the richness of biological variation, ranging from within-species genetic variation, through subspecies and species, to communities, and the pattern and dynamics of these on the landscape.

Biological Treatment

A wastewater treatment process that utilizes heavy growth of microorganisms for the purpose of oxidizing, absorbing, and adsorbing wastewater impurities, both organic and inorganic.

Biomagnification *Bioaccumulation/Bioconcentration*

Results from the process of bioaccumulation by which tissue concentrations of accumulated chemical compounds are passed up through two or more trophic levels so that tissue residue concentrations increase systematically as trophic level increases.

Biomonitoring (Biological Monitoring)

Systematic determination of the effects on organisms as a result of changes to an ecosystem. Often done to determine the effects of a pollutant release.

Biophysical Land Classification *Ecological Land Classification*

An approach to land classification that combines the physical and biological components of the environment. As the precursor to ecological land classification, the hierarchical classification system originally included four levels. Sometimes the physical components of classification are more heavily weighted than the biological components.

Biopile *Composting*

A contaminant treatment method whereby soil is piled in heaps several metres high over an air distribution system.

Bioreactor

A controlled environment that enhances the growth and activity of microorganisms so they can degrade contaminants.

Bioremediation

The use of microorganisms to remediate contaminated soil or water.

Biotransformation

The modification of a molecule by a living organism.

Bioventing

Pumping air into the soil above the water table to provide oxygen to aerobic bacteria.

Bitumen

The heavy viscous hydrocarbon associated with the Athabasca Oil Sands deposits. It contains some mineral and sulphur contamination.

Bog *Fen/Marsh/Peatland*

A peat-covered area or peat-filled wetland, generally with a high water table. The water table is at or near the surface. The surface is often raised or level with the surrounding wetlands, and is virtually unaffected

by the nutrient-rich groundwater from the surrounding mineral soils. Hence, the groundwater of the bog is generally acid and low in nutrients. The dominant peat materials are Sphagnum and forest peat underlain, at times, by fen peat. The associated soils are Fibrisols, Mesisols and Organic Cryosols. The bogs may be treed or treeless and they are usually covered with *Sphagnum* mosses, feathermosses, and ericaceous shrubs.

A peat-covered or peat-filled wetland, generally with a high water table having a low bearing strength. The water of a bog is generally acid and low in nutrients. Bogs usually support a black spruce forest but may also be treeless. They are usually covered with sphagnum and feathermosses and ericaceous shrubs.

Borrow Excavation

An excavation in the surface made solely for the purpose of removing, opening up or proving borrow material for the construction of the sub-base for a specific roadway project, and includes any associated infrastructure connected with the borrow excavation. (Regulatory definition)

Borrow Pit

A bank or pit from which earth is taken for use in filling or embanking.

Bottom Sediment

Those sediments that make up the bed of a body of running or still water.

Box Cut *Final Cut*

The initial cut driven in a property, where no open side exists; this results in a highwall on both sides of the cut.

Broadcast Seeding *Direct Seeding/Drill Seeding*

Scattering seed on the surface of the soil. Contrast with drill seeding which places the seed in rows in the soil.

Brown Moss Peat *Forest Peat/Sedge Peat/Sedimentary Peat/Sphagnum Peat*

Peat composed of various proportions of mosses of Amblystegiaceae (*Scorpidium, Drepanocladus, Calliergon, Campylium*), *Hypnum*, and *Tomenthypnum*.

Brunisolic *Chernozemic/Gleysolic/Luvisolic/Organic Soils/Podzolic/Regosolic/Solonetzic*

A soil order of sufficient development to exclude it from the Regosolic order, but without sufficient development to include it in any other order. These soils develop under various climates and vegetation, are frequently characterized by a reddish colour and have Bm or Btj horizons. The great groups Melanic Brunisol, Eutric Brunisol, Sombric Brunisol, and Dystric Brunisol belong to this order.

Buffering Capacity

Capacity of a soil to resist appreciable pH change in the soil solution.

Bulk Density (soil)

The mass of dry soil per unit of bulk volume. The mass is determined after drying to a constant weight at 105°C. The bulk volume is that of the sample as taken in the field and includes the volume of the solids and of the pore space. Measures of bulk density (Db) are expressed in SI units (kg m^{-3}) and/or units derived from them. Mg m^{-3} is the preferred unit. Derived units, such as Mg m^{-3}, t m^{-3} or g cm^{-3} are numerically equivalent. Db values generally range from 0.90 to 1.80 Mg m^{-3} (900 to 1800 kg m^{-3}). In commercial and engineering applications, Db is often expressed in lb ft^{-3} and it has been called apparent density.

C

C Horizon *A Horizon/B Horizon*

A mineral horizon comparatively unaffected by the pedogenic processes operative in the A and B horizons except for the process of gleying (Cg) or the accumulation of calcium carbonate (Cca) or other salts (Csa). A naturally calcareous C horizon is designated Ck.

Calcareous Soil

Soil containing sufficient calcium carbonate, often with magnesium carbonate, to effervesce visibly when treated with cold 0.1 N hydrochloric acid.

Calcium Carbonate Equivalent

The total inorganic carbon content of soil material expressed in terms of percent calcium carbonate ($CaCO_3$).

Calibration

Comparison of a measurement standard or instrument with another standard or instrument in order to report or eliminate by adjustment any variation (deviation) in the accuracy of the item being compared.

Capability (land) *Equivalent Capability/Land Classification*

An evaluation of land performance that focuses on the degree and nature of limitation imposed by the physical characteristics of a land unit on a certain use, assuming a management system.

The suitability of land for use without permanent damage. It is an expression of the effect of physical land conditions, including climate, on the total suitability for use, without damage, for crops that require regular tillage, for grazing, for woodland and for wildlife. Land capability involves consideration of the risks of land damage from erosion and other causes and the difficulties in land evaluation owing to physical land characteristics, including climate.

Capability Class (soil)

A rating that indicates the capability of land for some use such as agriculture, forestry, recreation, or wildlife. In the Canadian system, it is a grouping of lands that have the same relative degree of limitation or hazard. The degree of limitation or hazard is nil in Class 1 and becomes progressively greater to Class 7.

Capability Subclass (soil)

A grouping of lands that have similar kinds of limitations and hazards. It provides information on the kind of conservation problem or limitation. The class and subclass together provide information about the degree and kind of limitation, for broad landuse planning and for the assessment of conservation needs.

Capillary Action

The rise or movement of fluid in the interstices of a soil due to capillary forces.

Capillary Conductivity

(1) Physical property related to the readiness with which unsaturated soil transmits water.
(2) Ratio of water velocity to driving force in unsaturated soil.

Capillary Fringe

A zone just above the water table that remains near saturation (zero gauge pressure). The extent and degree of definition of the capillary fringe depends upon the size distribution of pores.

A zone, in which the pressure is less than atmospheric, overlying the zone of saturation and containing capillary interstices some or all of which are filled with water that is continuous with the water in the zone of saturation but is held above the zone by capillarity acting against gravity.

Capping (drilling wastes) *Landfarming/Land Treatment/Landspreading/Mix, Bury and Cover*

Capping refers to the burial of undisturbed sump contents. Sump contents are left in place and a layer of subsoil is carefully placed over the contents, which remain essentially undisturbed. Topsoil is then spread to cover the capped sump area.

Carcinogenicity *Mutagenicity*

The ability to produce cancer.

Catabolic

Breakdown of complex organic molecules by living things for energy.

Catalyst

Any substance that accelerates a chemical reaction but itself remains unaltered in form and amount (e.g., enzymes).

Catalyze

To accelerate a chemical reaction, typically by a catalyst.

Catena

A sequence of soils of about the same age, derived from similar parent materials, and occurring under similar climatic conditions, but of unlike characteristics due to variations in relief and drainage.

Cation *Anion*

An ion carrying a positive charge of electricity. The most common soil cations are calcium, magnesium, sodium, potassium, and hydrogen.

Cation Exchange

The interchange between a cation in solution and another cation on the surface of any surface-active material, such as clay colloid or organic colloid.

Cation Exchange Capacity (CEC)

A measure of the total amount of exchangeable cations that a soil can hold, expressed in terms of milliequivalents per 100 g of soil.

Check Dam

Small dam constructed in a gully or other small watercourse to decrease the streamflow velocity, minimize channel scour, and promote deposition of sediment.

Chernozemic *Brunisolic/Gleysolic/Luvisolic/Organic Soils/Podzolic/Regosolic/Solonetzic*

An order of soils that have developed under xerophytic or mesophytic grasses and forbs, or under grassland-forest transition vegetation, in cool to cold, subarid to subhumid climates. The soils have a dark-coloured surface (Ah, Ahe, or Ap) horizon and a B or C horizon, or both, of high base saturation. The order consists of the Brown, Dark Brown, Black, and Dark Grey great groups.

Chiseling *Ripping/Subsoiling*

Breaking or loosening the soil, without inversion, with a chisel cultivator or chisel plow.

A method of tillage in which hard, compact layers, usually in the subsoil, are shattered or loosened to depths below normal plow depth.

Chronic *Acute*

Involving stimulus that is lingering or continues for a long time; often signifies periods from several weeks to years, depending on the reproductive life cycle of the species. Can be used to define either the exposure or the response to an exposure (effect). Chronic exposure typically induces a biological response of relatively slow progress and long continuance.

Clay *Particle Size/Sand/Silt*

(1) As a rock term: a natural, earthy, fine grained material that develops plasticity with a small amount of water.
(2) As a soil term: a textural class.
(3) As a soil separate: a material usually consisting largely of clay minerals but commonly also of amorphous free oxides and primary minerals.
(4) As a particle-size term: a size fraction less than 0.002 mm equivalent diameter.

Climax Community *Seral Community*

The final, or most mature, plant community capable of self-perpetuation under the prevailing climatic and soil conditions.

Climax Species *Pioneer Species*

A climax plant species is defined as one that dominates a site under climax conditions.

Clod

A compact, coherent mass of soil, ranging in size from 5 to 10 mm to as much as 200 to 250 mm; produced artificially by the activity of plowing and digging when the soils, especially clays, are either too wet or too dry for normal tillage operations. Clods usually slake easily with repeated wetting and drying.

A term applied by miners to loosely consolidated shale commonly found in close conjunction with a coal bed.

Clone

All asexually derived individuals produced from a single sexually produced individual.

Coarse Fragments

Rock or mineral particles greater than 2.0 mm in diameter. Rounded and sub-rounded rock fragments up to 7.5 cm in diameter are referred to as gravelly; 7.5 cm to 25 cm are cobbly; and over 25 cm are stony or bouldery.

Coarse Texture (soil) *Fine Texture/Medium Texture*

The texture exhibited by sands, loamy sands, and sandy loams but not including very fine sandy loam. A soil containing large quantities of these textural classes.

Coefficient of Variation

A measure of precision that is calculated as the standard deviation of a set of values divided by he average and usually multiplied by 100 to be expressed as a percentage.

Cohesion *Adhesion*

The attraction of a substance for itself; the mutual attraction among particles comprising a substance that allows it to cling together as a continuous mass.

Colloid

A substance in a state of fine subdivision, whose particles are 10^{-4} cm to 10^{-7} cm in diameter.

Mineral or organic particles smaller than 0.002 mm that have properties determined by surface forces.

Colluvial Slope *Talus*

Sloping land at the foot of steep hills or mountains made up of deposits of unconsolidated material that has been moved over short distances by gravity, water, or both and includes talus material and local alluvium.

Colluvium *Alluvium*

A heterogeneous mixture of material that has been deposited mainly by gravitational action.

Cometabolism

The process whereby a compound that cannot support the growth of microorganisms can be modified or degraded when another growth-supporting substrate is present. The co-metabolized substance is not used for energy or incorporated into the biomass of the organism that modified it.

Common Species *Rare Species*

A species widely distributed and easily found within a given area.

Community

Populations of plants or animals living and interacting with one another in a given area.

Compactibility

The maximum density to which a soil can be packed by a given amount of energy. The standard method for determining soil compactibility is the Proctor test.

Compaction *Compression/Consolidation*

The moving of soil particles closer together by external forces. In the compaction process, individual soil particles are packed closer together and soil aggregates are crushed, thus greatly reducing porosity. The major causes of soil compaction are: (1) natural consolidation during soil forming processes (e.g., the weight of glaciers during the ice ages); (2) trampling by animals and humans; (3) natural shrinkage of soil upon drying; (4) use of heavy equipment.

Increasing the density of a material by reducing the voids between the particles by mechanical effort.

The closing of the pore spaces among the particles of soil and rock, generally caused by running heavy equipment over the area, as in the process of leveling the overburden material of strip mine banks.

Companion Crop

A crop sown with another crop. Used particularly for small grains with which forage crops are sown. Preferred to the term nurse crop.

Compost

Moist organic remains, or mixtures of organic remains and soil to which mineral fertilizers may be added, and which have been piled and allowed to decompose (artificial manure).

Composting *Biopiles*

The decomposition of organic matter in a pile by microorganisms. Contaminated soil to be composted is often amended with a bulking material such as straw or hay. Compost piles differ from biopiles in that compost piles have elevated temperatures due to microbial activity.

Composite Sample

A sample comprised of two or more subsamples.

Compressibility

The property of a soil pertaining to its susceptibility to decrease in bulk volume when subjected to a load. The change of specific volume and density under hydrostatic pressure; reciprocal of bulk modulus (volume elasticity; incompressibility modulus). Under increasing force per unit area a body will decrease in size but increase in density. The ease with which soil decreases in volume when subjected to a mechanical load. It is the slope of the straight line portion of void ratio, or bulk density vs. logarithm of stress.

Compressibility Index

The ratio of pressure to void ratio on the linear portion of the curve relating the two variables.

Compression *Compaction/Consolidation*

A system of forces or stresses that tends to decrease the volume or compact a substance, or the change in volume produced by such a system of forces. Compression of a saturated soil is consolidation and compression of an unsaturated soil is compaction.

Concentration

A measure of the amount of a substance present per unit volume or per unit weight of material.

Cone Index *Penetration Resistance*

The force per unit basal area required to push a cone penetrometer through a specified increment of soil.

Conifer

A tree belonging to the order Coniferae with cones and evergreen leaves of needle shape or "scalelike." The tree is harvested to produce wood known commercially as "softwood."

Confidence Limit (interval)

That range of values calculated from an estimate of the mean and the standard deviation that is expected to include the population mean with a stated level of confidence. Confidence limits in the same context may also be calculated for standard deviations, lines, slopes, and points.

Conservation *Sustainability*

The planning, management and implementation of an activity with the objective of protecting the essential physical, chemical and biological characteristics of the environment against degradation.

A policy which seeks to sustain future useable supplies of a natural resource by present actions.

The protection, improvement, and use of natural resources according to principles that will assure their highest economic or social benefits.

Conservation (soil)

(1) Protection of the soil against physical loss by erosion or against chemical deterioration; that is, excessive loss of fertility by either natural or artificial means.

(2) A combination of all methods of management and land use that safeguard the soil against depletion or deterioration by natural or man-induced factors.
(3) The division of soil science dealing with soil conservation and (1) and (2).

Consistence

(1) The resistance of a material to deformation or rupture,
(2) The degree of cohesion or adhesion of the soil mass.

Terms used in soil survey for describing consistence at various soil-water contents are:
Wet soil: non-sticky; slightly sticky; sticky; very sticky; non-plastic; slightly plastic; plastic and very plastic.
Moist soil: loose; very friable; friable; firm; very firm; compact; very compact; and extremely compact.
Dry soil: loose; soft; slightly hard; hard; very hard; and extremely hard.
Cementation: weakly cemented; strongly cemented, and indurated.

Consolidated Tailings/Composite Tailings

Composite (Syncrude) or consolidated (Suncor) tailings are formed by injecting mature fine tailings from the tailings pond into the regular (whole) tailings sand stream, with a floculant such as gypsum. This mixture is sent to the tailings ponds to form a non-segregating soil mixture which will result in a trafficable surface in the reclaimed landscape.

Consolidation

The gradual reduction in volume of a soil mass resulting from an increase in compressive stress. The adjustment of a saturated soil in response to increasing load involves the squeezing of water from pores and a decrease in the void ratio.

Contamination

The condition or state of soil, water, or air caused by a substance release or escape that results in an impairment of, or damage to, the environment, human health, safety, or property.

Contouring

The process of shaping the land surface to fit the form of the surrounding land.

Control

An area that is undisturbed or unaffected by an activity and therefore can serve as a comparison to assess the state of an area that has been disturbed or affected by an activity. Also know as a reference area. *Area control sites* are located further away than *local control sites*.

Control Samples

An environmental sample or simulated samples designed to help control the analytical process by checking the acceptability of some quality characteristic. These are often used synonymously with QC check samples.

Control Section

The vertical section upon which soil classification is based. The control section usually extends to a depth of 100 cm in mineral materials and to 160 cm in organic materials.

Conventional Crude Oil *Heavy Crude Oil/Light Crude Oil*

Petroleum found in liquid form, flowing naturally or capable of being pumped without further processing or dilution.

Cool Season Plants *Warm Season Plants*

Plants mostly of temperate origins completing the major proportion of their growth during the spring and early summer months.

Corridor

In a landscape, a narrow strip of land that differs from the matrix on either side. Corridors may be isolated strips, but are usually attached to a patch of somewhat similar vegetation.

Cover

The area of ground covered by all living (including stems and leaves) and dead (litter) plant material that is produced naturally on a site, expressed as a percentage of the total area. Bare soil is not cover. Also known as ground cover, canopy cover or aerial cover.

Cover Crop

A close-growing crop used primarily for the purpose of protecting and improving the soil between periods of regular crop production or before establishment of the final vegetation on a reclaimed site.

Cover Scale

A set of discrete classes defined by specific percentages that are used to estimate plant cover.

Coversoil *Regolith/Surface Soil/Topsoil*

Unconsolidated materials including salvaged surface soil, salvaged Regolith, or selected bedrock spoil used to top-dress spoils to build a better quality minesoil.

Creep

Slow mass movement of soil and soil material down rather steep slopes primarily under the influence of gravity, but aided by saturation with water and by alternate freezing and thawing.

Crimping

A soil stabilization technique that presses spread straw into the soil in a wave-like pattern. Crimping decreases surface erosion and creates a favourable microenvironment for plants.

Criteria *Guideline/Objective/Standard*

Generic numerical limits or narrative statements intended as a general guidance for the protection, maintenance, and improvement of specific uses of soil, water or land.

Crop Residue *Stubble Mulch*

The plant material left on the field following harvest, including stems, leaves, chaff and roots.

Crop Rotation

A planned sequence of crops grown in recurring succession on the same area of land.

Crust

A surface layer on cultivated soils, ranging in thickness from a few millimetres to perhaps as much as 2 cm, that is much more compact and/or hard and brittle when dry, than the material immediately beneath it.

Cultivar *Ecovar*

A plant variety that has undergone genetic selection by plant breeders and has been registered by a certifying agency, and is propagated under specific guidelines to maintain its genetic integrity.

An assemblage of cultivated plants which is clearly distinguished by its characters (morphological, physiological, cytological, chemical, or others) and which when reproduced (sexually or asexually), retains those distinguishing characters. The terms cultivar and variety are exact equivalents.

Cumulative

Brought about, or increased in strength, by successive additions at different times or in different ways.

Cut-and-fill

Process of earth moving by excavating part of an area and using the excavated material for adjacent embankments or fill areas.

D

DBH (Diameter at Breast Height)

The diameter of a tree at breast height. Diameter is measured at 1.3 to 1.5 m above ground surface.

Decommissioning *Decontamination*

The permanent closure of all or part of an industrial facility followed by removal of process equipment, buildings and other structures, and the decontamination of the surface and subsurface.

Decontamination *Decommissioning/Remediation*

The removal, reduction, or neutralization of substances, wastes or hazardous material from a site so as to prevent or minimize any adverse effects on the environment now or in the future.

Degradation (soil)

The changing of a soil to a more highly leached and weathered state, usually accompanied by morphological changes such as the development of an eluviated, light coloured A horizon or a decline in soil quality. Processes include wind and water erosion, salinity, organic matter depletion, acidification and compaction.

De Minimis Risk *Acceptable Risk/Risk*

A risk is *de minimis* if it is considered trivial or negligible. In practical terms, when a risk is judged to be *de minimis* there is no incentive to modify the activity that gives rise to the risk.

Depression

An area that is lower than the general surrounding landscape, usually less well drained than the surrounding terrain.

Derelict Land *Abandoned Mine*

Land voluntarily abandoned or willfully cast away by its owner with the intention of not retaking it.

Detritus

Non-living particles of disintegrating biological material (inorganic and dead and decaying organic material) that can be suspended in the water column or deposited at the bottom of lakes, streams, oceans, etc.

Direct Seeding *Broadcast Seeding/Drill Seeding*

Seeding with minimum disturbance and maximum surface residue retention.

Discovery Well *Exploratory Well*

An exploratory well that encounters a previously untapped oil or gas deposit.

Dispersal

The spreading of reproductive plant parts from one place or area to another.

Disperse

To cause aggregates to separate into individual soil particles. A disperse system is one in which at least one of the phases is subdivided into numerous small particles, which together exhibit a very large interfacial area per unit volume.

Dispersed Soil

Soil in which the clay readily forms a colloidal soil. Dispersed soils usually have low permeability. They tend to shrink, crack, and become hard on drying and to slake and become plastic on wetting.

Dissolved Oxygen (DO)

Oxygen that is present (dissolved) in water and is therefore available for fish and other aquatic organisms. Normally measured in mg/L (equivalent to ppm) and widely used as a criterion of water quality.

Disturbed Land

Land on which excavation has occurred or upon which overburden has been deposited, or both.

Diversity

The richness of species within a given area. Diversity includes two distinct concepts, richness of species and evenness in the abundance of the species.

Dominant

(1) A plant with the greatest cover and/or biomass within a plant community.
(2) The tallest trees within a forest stand, which extend above the general canopy.

Dose *Exposure*

The amount or concentration of a substance absorbed into the body. It requires exposure to the substance of interest.

Downstream Sector *Upstream Sector*

The downstream refining and marketing sector of the oil and gas industry consists of pipeline systems, refineries, gas distribution utilities, oil product wholesalers, service stations and petrochemical companies.

Drainage

The removal of excess surface water or groundwater from land by natural runoff and percolation, or by means of surface or subsurface drains.

Drainage Basin *Watershed*

Area tributary to or draining to a lake, stream, reservoir or other body of water

Drainage (soil)

Soil drainage refers to the frequency and duration of periods when the soil is not saturated. Terms used are - excessively, well, moderately, imperfectly, and poorly drained soil.

Drift

All material moved by glaciers and by the action of meltwater streams and associated lakes.

Drill Seeding *Broadcast Seeding/Direct Seeding*

Planting seed with a drill in relatively narrow rows, generally less than 30 cm apart.

Drilling Waste Fluid

Heterogeneous mixture of water, drilling muds, borehole cuttings, additives, and various other wastes that are specifically related to the actual drilling activity.

Components of the drilling waste that contain less than or equal to 5% solids. (Regulatory definition)

Drilling Waste Solid

The bottom layer of sump material comprised of drill cuttings, flocculated bentonite, weighting materials and other additives. Drilling waste solids can be stacked with minimal or no overflow of liquid.

Components of the drilling waste that contain more than 5% solids. (Regulatory definition)

Droughty Soil

Sandy or very rapidly drained soil.

Dysic *Euic*

A soil term referring to pH<<4.5 ($CaCl_2$) in all parts of the control section of an organic soil.

Dystrophy

The condition in water in which decay is hindered and recycling of nutrients is slowed; there is a high loading of allochthonous organic matter, but a low level of autochthonous input; dystrophic waters are heavily stained (brown water) and have a high content of humic substances.

E

EC_{50} (Median Effective Concentration) *LC_{50}*

The concentration of a chemical in the medium that results in some sublethal effect to 50% of the test organisms that are exposed in the test. The EC_{50} is normally reported as a time dependent value with the sublethal endpoint observed (e.g., 5-day EC_{50}, reproduction).

Ecological Descriptor

Variable making it possible to describe, compare or analyze ecological surveys. An ecological descriptor (e.g., altitude) does not have any direct physiological effect on living beings, but expresses the state of one or more ecological factors.

Ecological Management

(1) Derivation of goods or services from or beneath ecosystems in ways that respect ecological integrity. It is a bio-centred approach to resource use, in which human needs are met if the ecosystem's ability to manage itself is not compromised, focussing on the management of human activities more strongly than other ecosystem components.

(2) Derivation of goods or services from or beneath ecosystems in ways that consider, and (it is believed) do not seriously affect, ecological integrity. Ecosystem management is a human-centred approach to resource use, which aims at manipulation of ecosystem components and assumes sufficient knowledge of how ecosystem work.

Ecological Receptor

A non-human organism identified as potentially experiencing adverse effects from exposure to contaminated soil either directly through contact or indirectly through food chain transfer.

Ecosite

(1) A subdivision of an ecosection that consists of an area of land with a particular parent material, having a homogeneous combination of soils and vegetation. A Canadian ecological land classification (ELC) system mapping unit, usually mapped at a scale of 1:50 000 to 1:10 000. Originally referred to as a "land type".
(2) In Alberta, ecosite is defined as an area with a unique recurring combination of vegetation, soil, landform, and other environmental components.

Ecosite Phase

A subdivision of an ecosite based on the dominant tree species in the canopy. On some sites where a tree canopy is lacking, the tallest structural vegetation layer determines the ecosite phase.

Ecosystem

A complex of living organisms and their environment, linked by energy flows and material cycling.

An ecological community considered together with the nonliving factors of its environment as a unit.

Ecosystem Association *Ecosite*

An area having the potential of supporting plant communities with similar successional development and belonging to the same plant association, within the biogeoclimatic classification system.

Ecosystem Type *Ecosite*

An abstract classification unit defined as an area belonging to the same soil family with the potential of supporting vegetation belonging to the same plant association, within the biogeoclimatic classification system.

Ecotone

A transition zone of vegetation between two communities, which has characteristics of its own and of both types of adjacent vegetation.

Ecotype

A local ecological race adapted through natural selection to a particular habitat.

Ecovar *Cultivar*

The offspring of native species that have been selected for their ability to survive and reproduce in specific ecological regions. Selection is done without emphasis on improving agronomic characteristics. Ecovars have greater genetic diversity than cultivars.

Edaphic

(1) Of or pertaining to the soil.
(2) Resulting from, or influenced by, factors inherent in the soil or other substrate rather than by climatic factors.

Effective Precipitation

The portion of the total precipitation that becomes available for plant growth.

Effects-based

The use of data indicating adverse effects from toxicological studies to form the basis for criteria derivation.

Electrical Conductivity (EC)

The reciprocal of electrical resistivity. Expressed in deci-Siemens per metre (dS/m). EC provides a measure of water-soluble salt content.

Eluvial *Illuvial*

Soil material that has been transported via suspension or solution to another soil horizon via the downward movement of water.

Eluviation *Illuviation*

The removal of soil material in suspension or in solution from a layer or layers of the soil by the downward or lateral movement of water.

Emergent Vegetation

Plant species that have a part extending below the normal water level. Such plants are adapted to periodic flooding and include genera such as *Carex*, *Scirpus*, and *Typha*.

Encapsulation (drilling wastes)

This method involves the total containment of the decanted sump contents by using low permeability liners. These liners can be clay liners with a permeability of 1×10^{-7} cm/s, or less, or an approved synthetic liner. After treatment and decanting of the liquid layer, the remaining solids are capped by one metre of compacted material. Finally, subsoil and topsoil are spread over the encapsulated area.

End Point

(1) The variable(s) (i.e., time, reaction to the organism, etc.) that indicate(s) the termination of a test.
(2) The measurement(s) or value(s) derived that characterize(s) the results of the test (e.g., EC_{50}, LC_{50}).

Environmental Hazards (health)

Any biological, chemical, or physical agents found in or transmitted through the air, water, food, soil, vectors, or manufactured items that may adversely affect the physical and psycho-social health or well-being of the public.

Environmental Health

The study of the protection of human populations from biological, chemical, and physical hazards in their environment.

Eolian Deposit *Fluvial*

Sand or silt, or both, deposited by wind, including both loess and dune sand.

Epidemiology

The study of the distribution and determinants of disease frequency in humans. It may involve the observation of unusual clusters of a rare disease, descriptive statistics on morbidity and mortality patterns, ecological studies correlating disease occurrence rates with geographic or spatial risk factors, and analytical studies of the relationship between disease occurrence rates and exposure to particular toxicants.

Equivalent Land Capability *Capability (land)*

The ability of the land to support various land uses after reclamation is similar to the ability that existed prior to any activity being conducted on the land, but the ability to support individual land uses will not necessarily be equal after reclamation. (Regulatory definition)

Ericaceous

Of or relating to the heath family.

Erodibility

A measure of the susceptibility of a soil to particle detachment and transport by rainfall and runoff.

Erosion

The wearing away of the land surface by running water, wind, ice, other geological agents, activities of man or animals, and including such processes as gravitational creep. Erosion may be either normal or accelerated; the latter being brought about by changes in the natural cover or ground conditions, including those due to human activity.

Essential Element (plant nutrition) *Nutrient*

A chemical element required for the normal growth of plants.

Estimated Daily Intake (EDI) *Exposure/Tolerable Daily Intake*

The total concurrent exposure to a contaminant experienced by the average person, from all known or suspected sources (food, water, air, soil, consumer products).

Euic *Dysic*

A soil term referring to pH >4.5 ($CaCl_2$) in all parts of the control section of an organic soil.

Eutrophic *Mesotrophic/Oligotrophic*

Term referring to peatlands that are relatively nutrient-rich; also refers to soils and waters with high nutrient content and high biological activity.

Evapotranspiration

(1) The process of evaporation of water from a soil surface together with transpiration by plants.
(2) Potential evapotranspiration is the maximum transpiration that can occur in a given weather situation with a low-growing crop that is not short of water and does not completely shade the ground.

Exchangeable Bases

Cations or bases adsorbed onto soil colloids.

Exotic Species *Alien/Native Species*

Plant species that are not native to the province and which are not native within the natural region.

Exploration

Any operations on or over land or water to determine geologic or other conditions underlying the surface of land or water that results in surface disturbance or that may cause an adverse effect but excludes any exploration that is the subject of a permit, license or approval under the Exploration Regulation (Alta. Reg. 423/78). (Regulatory definition)

Exploratory Well *Discovery Well*

A well into an area where petroleum has not been previously found or one targeted for formations above or below known reservoirs

Exposure *Dose*

Contact between a substance and an individual or population. It may occur via different pathways including oral, dermal and inhalation.

Exposure Characterization

Identification of the conditions of contact between a substance and an individual or population. It may involve identification of concentration, routes of uptake, target sources, environmental pathways, and the population at risk.

Exposure Estimation

Estimation of the amount and duration of contact between a substance and an individual or a population. It may consider such factors as concentration, routes of uptake, target sources, environmental pathways, population at risk, and timescale.

Exposure Pathway

The route by which an organism comes into contact with a contaminant. In the ecological effects-based procedure, exposure pathways are restricted to organisms that come in contact through consumption of contaminated food, direct soil ingestion and dust inhalation.

***Ex Situ* Treatment** *In Situ Treatment*

A method of treatment and/or disposal for contaminated soils, sludges, and waters (generated as a result of decontamination activities) once they have been physically removed or excavated from where they originate.

Extract (soil)

The solution separated from a soil suspension or from a soil by filtration, centrifugation, suction, or pressure.

F

Fallow

Allowing cropland to lie idle either tilled or untilled during the whole or greater portion of the growing season. Tillage is usually practiced to control weeds and encourage the storage of moisture in the soil. Chemical control of weeds may replace tillage (chemical summerfallow or chemfallow).

Fen *Bog/Marsh/Peatland*

A peat-covered or peat-filled wetland with a high water table that is usually at or above the surface. The waters are mainly nutrient-rich, minerotrophic waters from mineral soils. The dominant peat materials are shallow to deep, well to moderately decomposed fen peat. The associated soils are Mesisols, Humisols, and Organic Cryosols. The vegetation consists dominantly of sedges, grasses, reeds, and brown mosses, with some shrub cover and, at times, a scanty tree layer.

Fertility (soil)

The status of a soil in relation to the amount and availability to plants of elements necessary for growth.

Fibre (rubbed or unrubbed)

The organic material retained on a 100-mesh sieve (0.15 mm) either with or without rubbing, except for wood fragments that cannot be crushed in the hand and are larger than 2 mm in the smallest dimension. Rubbed fibre refers to materials rubbed between the fingers ten times or processed in a blender.

Fibric *Humic/Mesic*

Organic materials containing large amounts of weakly decomposed fibres whose botanical origins are readily identifiable; fibric material has 40% or more of rubbed fibre by volume (or weight of rubbed fibre retained on a 100 mesh sieve) and is classified in the von Post scale of decomposition as class 1 to class 4.

Field Capacity *Water Content*

The amount of water retained in the soil after the soil has been saturated and free drainage has practically ceased.

Fill *Backfill*

Depth of which material is to be placed (filled) to bring the surface to a predetermined grade. Also, the material itself.

Final Cut (End Cut) *Box Cut*

Last cut or line of excavation made on a specific property or area.

Fines (oil sands tailings)

Mineral which includes fine sand, silt, and clay smaller than about 44 microns. The size split is somewhat arbitrary, related to standard screen mesh and/or analytical technique and the required interpretation.

Fine Tailings (Fine Tails, Sludge) *Consolidated Tailings /Tailings*

A term used in the oil sands industry to refer to the material accumulating at the bottom of oil sands tailings ponds. It is a matrix of dispersed clays, fine minerals, residual hydrocarbons, and various contaminants. Note that whole tailings (plant tailings) includes tailings sand which settles rapidly and is used to form tailings dykes.

Fine Texture (soil) *Coarse Texture/Medium Texture*

Consisting of or containing large quantities of the fine fractions, particularly silt and clay.

Fixation (drilling wastes)

Process which chemically and/or physically changes material such that its final leaching characteristics are more accepted for disposal.

Flow Line *Pipeline*

Pipe, usually buried, through which oil or gas travels from the well to a processing facility.

Flushing *Residence Time*

The rate at which water passes through a waterbody.

A mechanism that removes dissolved/suspended nutrients from an aquatic system.

Fluvial (deposits) *Alluvium/Colluvium/Eolian Deposit/Glaciofluvial*

Material that has been transported and deposited by streams and rivers.

Forage

Unharvested plant material that can be used as feed by domestic animals. Forage may be grazed or cut for hay.

Forb *Herb*

A herbaceous plant which is not a grass, sedge, or rush.

Forest Floor

Organic layer on soil surface consisting of one or more of L, F, and H horizons.

Forest Land *Afforestation/Reforestation*

Land bearing a stand of trees at any age or stature, including seedlings and of species attaining a minimum of 6 feet average height at maturity or land from which such a stand has been removed but on which no other use has been substituted. The term is commonly limited to land not in farms, forests on farms are commonly called woodland or farm forests.

Forest Peat *Brown Moss Peat/Sedge Peat/Sedimentary Peat/Silvic/Sphagnum Peat*

Peat materials derived mainly from trees such as black spruce, and from ericaceous shrubs and feather mosses.

Formulation

The mixture of active ingredients with carriers, diluents or other materials to make them safe and easy to store, transport, dilute and/or apply.

Freeboard

Vertical distance between the maximum water surface elevation anticipated in design and the top of retaining banks or structures provided to prevent overtopping because of unforeseen conditions.

Friable *Consistence*

A term pertaining to the ease of crumbling of soils.

Furrow

A channel worked into the surface of the soil by an implement such as a plough or hoe.

G

Gabion

A mesh container used to confine rocks or stones and used to construct dams and groins or lining stream channels.

Gamma Probe *Neutron Probe*

An instrument for measuring soil moisture or density by relating the fraction of emitted radiation received by the detector to the soil wetness.

Glaciofluvial *Fluvial*

Pertaining to the meltwater streams flowing from wasting glacier ice and especially to the deposits and landforms produced by streams; relating to the combined action of glaciers and streams.

Glaciomarine

Relating to process or deposits that involve the action of glaciers and the sea or the action of glaciers in the sear. Sediments of glacial origin laid down from suspension in a marine environment in close proximity to glacier ice.

Gleyed Soil

A soil affected by gleysation.

Gleysation

A soil-forming process under conditions of poor drainage resulting in reduction of iron and other elements and in grey colours and mottles.

Gleysolic *Brunisolic/Chernozemic/Luvisolic/Organic Soils/Podzolic/Regosolic/Solenetzic*

An order of soils developed under wet conditions and permanent or periodic reduction. These soils have low chromas, or prominent mottling, or both, in some horizons. The great groups Gleysol, Humic Gleysol, and Luvic Gleysol are included in the order.

Graminoid Wetlands

Wetlands dominated by grass or sedge species.

Grazing System

A plan which schedules when and where livestock are to graze in order to accomplish a desired result.

Great Group *Order*

A category in the Canadian system of soil classification. It is a taxonomic grouping of soils having certain morphological features in common and a similar pedogenic environment.

Green Area *White Area*

That part of Alberta shown outlined and coloured green on the map annexed to;

(1) a Ministerial Order dated April 15, 1989 and made pursuant to Section 10 of the Public Lands Act (Regulatory definition), as that order is amended from time to time, or

(2) any order made in substitution for that order, as amended from time to time.

Green Manure Crop

Any crop or plant grown and ploughed under while green or soon after maturity to improve the soil by addition of organic matter and the subsequent release of plant nutrients, especially nitrogen.

Ground Cover

Any living or dead vegetative material producing a protective mat on or just above the soil surface.

Groundwater

That water which at any particular time is either passing through or standing in the soil and underlying strata and is free to move under the influence of gravity.

Growing Season

Period with soil temperatures over 5°C at a depth of 50 cm.

Grubbing

The process of clearing stumps and roots from land.

Guideline *Criteria/Objective/Standard*

A numerical concentration or narrative statement recommended to support and maintain a designated use. In contaminant work a guideline is generally derived from the lowest observable effect level (LOEL) obtained from biological tests of chronic toxicity. The LOEL is multiplied by a safety factor to provide for long-term protection of species or uses.

Gully Erosion *Rill*

Erosion of soil or soft rock material by running water that forms distinct, narrow channels that are larger and deeper (30 cm to 30 m) than rills and that usually carry water only during and immediately after heavy rains or following the melting of ice or snow.

H

Habitat

The natural environment of an organism.

Habitat Type

The basic unit of vegetation classification in the system developed by R. Daubenmire and used in the northern United States, defined as an area capable of producing similar plant communities at climax. Vegetation stands included within a habitat type are not necessarily dominated by climax ecosystems.

Hardiness

The ability to withstand severe climates, especially frost during the growing season.

Hardpan *Pans*

A hardened soil layer in the lower A or in the B horizon caused by cementation of soil particles with organic matter or with materials such as silica, sesquioxides, or calcium carbonate. The hardness does not change appreciably with changes in the moisture content, and pieces of the hard layer do not slake in water.

Haul Road

Road from pit to loading dock, tipple, ramp, or preparation plant used for transporting mined material by truck.

Hazard *Risk*

The adverse impact on health that can result from exposure to a substance. The significance of the adverse effect depends on the nature and severity of the hazard and the degree to which the effect is reversible. In some instance the substance itself is also sometimes referred to as the hazard, rather than the adverse effect which the substance can cause.

Hazard Identification

Identification of effects capable of adversely affecting health as a result of exposure to a substance. It may utilize case reports, toxicological studies, epidemiological investigations, or structure/activity analysis.

Heavy Crude Oil *Conventional Crude Oil/Light Crude Oil*

Oil with a gravity below 28 degrees API.

Herb

Any flowering plant except those developing persistent woody bases and stems above ground.

Highwall

The unexcavated face of exposed overburden and mineral in a surface mine or the face or bank on the hill side of a contour strip mining excavation.

Hue

A colour or shade of colour in the Munsell Soil Color such as red, green, or blue.

Humic *Fibric/Mesic*

Organic material that is at an advanced stage of decomposition. It has the lowest amount of fibre, the highest bulk density, and the lowest saturated water-holding capacity of the organic materials; it is physically and chemically stable over time, unless it is drained; the rubbed fibre content is % by volume and the material usually is classified in the von Post scale of decomposition as class 7 or higher.

Humic Substances

A general category of naturally occurring, biogenic heterogeneous organic materials that can generally be characterized as being yellow to black in colour, of high molecular weight, and refractory.

Humification

The processes by which organic matter decomposes to form humus.

Humus

(1) The fraction of the soil organic matter that remains after most of the added plant and animal residues have decomposed. It is usually dark coloured.
(2) Used in the broader sense to refer to forest humus forms (mor, moder, mull).
(3) All the dead organic material on and in the soil that undergoes continuous breakdown, change, and synthesis.

The more or less stable fraction from the decomposed soil organic material, generally amorphous colloidal, and dark coloured.

Hydraulic Conductivity *Permeameter/Relative Hydraulic Conductivity/Saturated Hydraulic Conductivity*

(1) The ability of the soil to transmit water in liquid form through pores; includes properties of the fluid.
(2) The factor of proportionality in Darcy's equation relating flow velocity to hydraulic gradient having units of length per unit of time.
(3) A property of the porous medium and the water content of the medium.

Hydraulic conductivity is sometimes referred as the coefficient of permeability.

Hydraulic Head

The energy per unit weight of water made up of the sum of the pressure potential (head), velocity potential (head), and elevation potential (head). The velocity head is often negligible and taken as zero for subsurface flow. Hydraulic head is often referred to as water potential.

Hydromorphic

Developed under conditions of excess moisture; hydromorphic soils are found in areas of poor drainage.

Hydrophilic

Molecules and surfaces that have a strong affinity for water molecules. These molecules tend to be polar in chemical nature.

Hydrophobic

Molecules and surfaces that have little to no affinity for water, and typically have more affinity for other hydrophobic substances than for water. These molecules tend to be bi-polar or non-polar in chemical structure, such as lipids.

Hydrophobicity
The relative measure of the affinity of a molecule for water.

Hydrophyte *Mesophyte*
A plant that grows in water, or in wet or saturated soils; water-loving.

Hydrotransport
A method of transporting granular material, such as oil sands or extraction tailings, in a water-based slurry in a pipeline.

I

Illuvial *Eluvial*
Soil material that has been moved from one soil horizon to another (usually a lower one) by precipitation from solution or deposition from suspension.

Illuviation *Eluviation*
The process of deposition of soil material removed from one horizon to another in the soil, usually from an upper to a lower horizon in the soil profile. Illuviated compounds include silicate clays, iron and aluminum hydrous oxides, and organic matter.

Impermeability *Permeability*
The condition of a rock, sediment, or soil that renders it incapable of transmitting fluids under pressure.

Impervious
Resistant to penetration by fluids or by roots.

Inactivation
A reaction resulting in a substance (herbicide) being no longer chemically active.

Incineration
A thermal treatment process which destroys contaminants by oxidation in a controlled environment, at temperatures that reduce contaminants to ashes, inert gases, or vapours.

Indicator Plants
Plants characteristic of specific soil or site conditions.

Inert Waste
Any solid waste that, upon disposal to land, is not reasonably expected to undergo physical, chemical and/or biological changes to such an extent as to produce substances that may cause an adverse effect.

Infiltration *Percolation/Runoff*
Downward water movement into the soil.

Infiltration Rate
A soil characteristic determining or describing the rate at which water can enter the soil under specified conditions, including the presence of excess water. It has the dimensions of velocity.

Infiltrometer

A device for measuring the rate of entry of fluid into a porous body, for example, water into soil.

Injection Well

A well used for injecting fluids (air, steam, water, natural gas, gas liquids, surfactants, alkalines, polymers, etc.) into an underground formation for the purpose of increasing recovery efficiency.

Inoculation

The artificial introduction of microorganisms into a habitat or their introduction into a culture medium.

Inorganic

Not pertaining to or derived from plant or animal origins (organisms).

A chemical of mineral origin which does not contain (with few exceptions) carbon or carbon compounds.

***In Situ* Treatment** *Ex Situ Treatment*

A method of managing or treating contaminated soils, sludges and waters "in place" in a manner that does not require the contaminated material to be physically removed or excavated from where it originates.

Invasive Plant

A plant that has moved into a habitat and reproduced so aggressively that it has displaced the original structure of the vegetation community.

Irrigation

The artificial application of water to the soil for the benefit of growing crops.

K

Keystone Species

A species that is disproportionately important in the maintenance of community integrity, and without which significant changes to the community would occur.

L

LC_{50} (Median Lethal Concentration) *EC_{50}*

The concentration of chemical in the medium that results in mortality to 50% of the test organisms that are exposed. The LC_{50} is usually expressed as a time-dependant variable (e.g., 96-hr LC_{50}). The LC_{50} is normally statistically derived through analysis of mortality data from all test concentrations.

Lacustrine

Material deposited in lake water and later exposed.

Land

The solid part of the earth's surface or any part thereof. A tract of land is defined geographically as a specific area of the earth's surface. Its characteristics embrace all reasonably stable, or predictably cyclic, attributes of the biosphere vertically above and below this area, including those of the atmosphere, the soil, and the underlying geology, the hydrology, and plant and animal populations, and the results of past and present human activity, to the extent that these attributes exert a significant influence on the present and future uses of land by man.

Land Capability *Capability*

The ability of the land to support a given land use, based on an evaluation of the physical, chemical and biological characteristics of the land, including topography, drainage, hydrology, soils and vegetation.

Land Classification *Capability*

Classification of specific bodies of land according to their characteristics or to their capabilities for use. A use capability classification may be defined as one based on both physical and economic considerations according to their capabilities for man's use, with sufficient (mapping) expression to indicate those differences significant to man.

Landfarming (drilling wastes) *Capping/Land Treatment/Landspreading/Mix, Bury and Cover*

Applicable to wastes containing high amounts of organic compounds. This technique utilizes the soil microbial population to degrade to organic components. Application rates of the wastes are generally lower than for landspreading and are made often (more than once annually).

Landfill

A waste management facility at which waste is disposed by placing it on or in land in a manner that minimizes adverse human health and environmental effects.

Landforms

The various shapes of the land surface resulting from a variety of actions such as deposition or sedimentation (eskers, lacustrine basins), erosion (gullies, canyons) and earth crust movements (mountains).

Landscape

All the natural features such as fields, hills, forests, water, etc., which distinguish one part of the earth's surface from another part. Usually that portion of land or territory which the eye can see in a single view, including all its natural characteristics.

Landspreading (drilling wastes) *Capping/Landfarming/Land Treatment/Mix, Bury and Cover*

Usually done for wastes containing elevated levels of heavy metals and/or salts. The application rate is determined by the soil assimilative capacity for the constituents of concern and involves a single application only.

Land Treatment (drilling wastes) *Capping/Landfarming/Landspreading/Mix, Bury and Cover*

A drilling waste disposal practice involving either landspreading or landfarming operations.

Land Use Planning

The development of plans for the uses of land that, over long periods, will best serve the general welfare, together with the formulation of ways and means for achieving such uses.

Leachate

Used to emphasize the chemical species in an aqueous medium. Leachate may have several chemical species in varying concentrations in an aqueous medium. Leachate may also be generated by organic solvents.

Leaching

The removal of soil material in solution by the downward or lateral percolation of water.

Lease

(1) A legal document giving an operator the right to drill for or produce oil or gas;

(2) The land on which a lease has been obtained.

Legume *Nitrogen Fixation/Rhizobia*

A member of the legume or pulse family, leguminosae. One of the most important and widely distributed plant families. Includes many valuable food and forage species, such as the peas, beans, peanuts, clovers, alfalfas, sweet clovers, lespedezas, vetches and kudzu. Practically all legumes are nitrogen-fixing plants.

Light Crude Oil *Conventional Crude Oil/Heavy Crude Oil*

Liquid petroleum with a gravity of 28 degrees API or higher.

Lime

Strictly, calcium oxide (CaO), but as commonly used in agriculture terminology calcium carbonate ($CaCO_3$) and calcium hydroxide ($Ca(OH)_2$) are included. Agricultural lime refers to any of these compounds, with or without magnesia, used as an amendment for acid soils.

Lime Requirement

The amount of agricultural limestone, or the equivalent of another liming material, required per hectare to a soil depth of 15 cm (or for 2,240 t of soil) to raise the pH of the soil to a specific value under field conditions.

Limnic

Peat formation occurring on or in deep water by free-floating or deeply rooted plants.

Liquid Limit *Atterberg Limits/Plastic Limit*

(1) The water content corresponding to an arbitrary limit between the liquid and plastic states of consistence of a soil.
(2) The water content at which a pat of soil, cut by a standard sized groove, will flow together for a distance of 12 mm under the impact of 25 blows in a standard liquid limit apparatus.

Lithic Layer

Bedrock under the control section of a soil.

Hard, consolidated bedrock.

A feature of a soil subgroup which indicates a bedrock contact within 50 cm of the soil surface.

Litter

The amount of previous year's plant growth left on the soil surface for nutrient recycling.

Littoral Zone

Productive shallow-water zone of lakes, rivers or seas with light penetration to the bottom – often occupied by rooted aquatic plants.

The biogeographic zone between the high- and low-water marks.

Long-term Exposure *Dose/Exposure/Short-term Exposure*

An exposure to a contaminant in a medium lasting from several weeks to years and often includes a reproductive or life cycle of the test organism. Usually referred to as a chronic exposure. Absolute definitions for this term vary.

Lower Subsoil *Upper Subsoil*

The soil material lying below the upper subsoil.

Lowest Observed Effect Concentration (LOEC) *NOEC*

The lowest concentration of a chemical used in a toxicity test that has a statistically significant adverse effect on the exposed population of test organisms relative to a control.

Luvisolic *Brunisolic/Chernozemic/Gleysolic/Organic Soils/Podzolic/Regosolic/Solenetzic*

An order of soils that have eluvial (Ae) horizons, and illuvial (Bt) horizons in which silicate clay is the main accumulation product. The soils developed under forest of forest-grassland transition in a moderate to cool climate. The Grey Luvisol great group is the most common in western Canada.

Lysimeter

(1) A device for measuring percolation and leaching losses of water and solutes from a column of soil under controlled conditions.
(2) A device for measuring gains (precipitation and condensation) and losses (evapotranspiration) of water by a column of soil.

A device to measure the quantity or rate of water movement through or from a block of soil, usually undisturbed or *in situ*, or to collect such percolated water for quality analysis.

M

Macronutrient *Micronutrient/Nutrient*

A chemical element necessary in large amounts, usually greater than 1 ppm in the plant, for the growth of plants and usually applied artificially in fertilizer of liming materials. Macro refers to the quantity and not to the essentiality of the element to the plant.

Macrophyte

A member of the macroscopic plant life (larger than algae) especially of a body of water.

Marsh *Bog/Fen/Peatland*

A class in the Canadian wetland classification system; a marsh is a mineral or a peat-filled wetland which is periodically inundated by standing or slowly moving water. Surface water levels may fluctuate seasonally, with declining levels exposing drawdown zones of matted vegetation or mud flats. The waters are nutrient-rich. The substratum usually consists dominantly of mineral material, although some marshes are associated with peat deposits. The associated soils are dominantly Gleysols with some Humisols and Mesisols. Marshes characteristically show a zonal or mosaic surface pattern of vegetation consisting of unconsolidated grass and sedge sods, frequently interspersed with channels or pools of open water. Marshes may be bordered by peripheral bands of trees and shrubs, but the predominant vegetation consists of a variety of emergent non-woody plants such as rushes, reeds, reed-grasses, and sedges. Where open water areas occur, a variety of submerged and floating aquatic plants flourish.

Mass Movement (Mass Wasting)

Movements of large portions of the land surface caused by either water saturation or water saturation and frost action. Mass movements include landslides, mud slides, creep, congeliturbation and solifluction.

Medium Texture (soil) *Coarse Texture/Fine Texture*

Intermediate between fine-textured and coarse-textured. It includes the following textural classes: very fine sandy loam, loam, silt loam, and silt.

Mesic *Fibric/Humic*

Organic materials at a stage of decomposition between that of fibric and humic materials; peat soil material with >10% and <40% rubbed fibres; mesic material usually is classified in the von Post scale of decomposition as class 5 or 6.

Mesophyte *Hydrophyte*

A plant that grows under intermediate moisture conditions.

Mesotrophic *Eutrophic/Oligotrophic*

Containing a moderate amount of plant nutrients.

Metabolism

The total of all chemical reactions by which energy is provided for vital processes and new cell substances are assimilated.

Metabolite

The chemical product of changes to a parent molecule, including chemicals participating in metabolism.

Micro-climate

A local climatic condition near the ground resulting from modification of the general climate by local differences in elevation, exposure, or cover.

Microfauna

The part of the animal population consisting of individuals that are too small to be clearly distinguished without the use of a microscope. It includes protozoa and nematodes.

Microflora

Plants that are too small to be distinguishable without the aid of a microscope. Plants in this category include algae, bacteria, and fungi.

Micronutrient *Macronutrient/Nutrient/Trace Element*

A chemical element necessary in only extremely small amounts for plant growth.

Microrelief

Small-scale, local differences in relief, including mounds, swales, or hollows.

Mine *Pit/Quarry*

Any opening in, excavation in, or working of the surface or subsurface for the purpose of working, recovering, opening up, or proving coal, a coal bearing substance, oil sands or an oil sands bearing substance and includes any associated infrastructure. (Regulatory definition)

Mine Dump *Spoil*

Area covered with overburden and other waste materials from ore and coal mines, quarries and smelters, and usually having little or no vegetative cover prior to reclamation.

Mineral

A homogeneous naturally occurring phase, sometimes restricted to inorganic, crystalline phases.

Mineralization

The ultimate degradation and recycling of an organic molecule into inorganic materials, such as carbon dioxide and water.

(1) The conversion of an element from naturally occurring crystalline phases.
(2) The conversion of an element from an organic form to an inorganic state as a result of microbial decomposition.

Minerals

All naturally occurring minerals, including, without limitation, gold, silver, uranium, platinum, pitchblende, radium, precious stones, copper, iron, tin, zinc, asbestos, salts, sulphur, petroleum, oil, asphalt, bituminous sands, oil sands, natural gas, coal, anhydrite, barite, bauxite, bentonite, diatomite, dolomite, epsomite, granite, gypsum, limestone, marble, mica, mirabilite, potash, quartz rock, rock phosphate, sandstone, sorpentine, shale, slate, talc, thenardite, trona and volcanic ash. (Regulatory definition)

Mineral Soil

A soil consisting predominantly of, and having its properties determined predominantly by, mineral matter. It contains less than 17% organic carbon except for an organic surface layer that may be up to 40 cm (16 inches) thick if formed of mixed peat (bulk density 0.1 or more) or 60 cm (24 inches) if formed of fibric moss peat (bulk density less than 0.1).

Minerotrophic

A supply of water to vegetation originally derived from mineral soils or rocks but sometimes via lakes or rivers as intermediates; it may be eutrophic, mesotrophic, or oligotrophic.

Minesoil *Reconstructed Profile*

Soil produced by mining and reclamation activities that is capable of supporting plant growth.

Minimal Disturbance

Reducing the area of disturbance from the survey perimeter (maximum) to that deemed necessary to safely conduct the activity as well as ensuring the maintenance of equivalent soil capability.

Mire

(1) an English word which is, in the general sense, a term embracing all kinds of peatlands and peatland vegetation (bog and fen);
(2) a section of wet, swampy ground; bog; marsh; wet, slimy soil of some depth; deep mud, etc.

Mitigation

The process of rectifying an impact by repairing, rehabilitating or restoring the affected environment, or the process of compensating for the impact by replacing or providing substitute resources or environments.

Mix, Bury and Cover (drilling wastes) *Capping/Landfarming/Land Treatment/Landspreading*

A method whereby sump solids are stabilized and diluted by mixing with subsoil. The waste materials must be mixed with the subsoil in a ratio of at least 3 parts subsoil to 1 part waste. The stable waste is then placed into the original sump, or other sumps, and is covered with at least one metre of clean subsoil, and then the original topsoil.

Modal Site

A well-to moderately well-drained site without topographic or edaphic extremes that could reflect the influences of regional climate rather than local site conditions. Also used to describe typical site conditions for an ecosystem unit.

Moisture Content (soil) *Saturation Percentage*

Percentage of soil volume occupied by water (% volume/volume).

Moisture-Retention Curve

A graph showing the soil-moisture percentage (by weight or by volume) versus applied tension or pressure. Points on the graph are usually obtained by increasing or decreasing the applied tension or pressure over a specified range.

Morphology (soil)

(1) The physical constitution, particularly the structural properties, of a soil profile as exhibited by the kinds, thickness, and arrangement of the horizons in the profile, and by the texture, structure, consistence, and porosity of each horizon.
(2) The structural characteristics of the soil or any of its parts.
(3) The makeup of the soil, including the texture structure consistence, colour, and other physical mineralogical and biological properties of the various horizons of the soil profile.

Mottles

Spots or blotches of different colour or shades of colour found in imperfectly drained soils.

Mottling

Formation or presence of soil mottles.

Muck

Fairly well decomposed organic soil material relatively high in mineral content, dark in colour, and accumulated under conditions of imperfect drainage.

Muck Soil

An organic soil consisting of highly decomposed material.

Mulch

Any material such as straw, sawdust, woodchips, leaves or loose soil that is spread on the soil surface to protect the soil and plant roots from the effects of raindrops, wind erosion, soil crusting, freezing and evaporation.

Muskeg *Peatland*

A North American term frequently employed for peatland. The word is of Algonquin Indian origin and is applied in ordinary speech to natural and undisturbed areas covered more or less with *Sphagnum* mosses, tussocky sedges, and an open growth of scrubby trees.

Mutagenicity *Carcinogenicity*

The ability of a chemical to produce a permanent change in the genetic material.

Mycorrhiza *Actinomycetes*

The association of fungi with the roots of seed plants.

N

Native Landscape

A landscape that contains assemblages of plants and plant communities that are indigenous to a particular region.

Native Prairie

An area of unbroken grassland or parkland dominated by non-introduced species.

Native Species *Agronomic/Alien/Exotic Species*

A species that is a part of an area's original fauna or flora.

Natural Area

An area that is in a largely undisturbed condition, characterized by plant and animal species native to the area.

Natural Attenuation

A remediation approach that relies on natural processes to remediate a site with no human intervention. The natural processes include physical/chemical mechanisms such as dilution, dispersion and adsorption of the contaminant. Biological processes, such as the unassisted growth of plants and microbial communities that break down contaminants, may be involved as well.

Natural Gas Liquids

Liquids obtained during natural gas production, including ethane, propane, butanes, and condensate.

Naturalized Plant *Alien*

A plant introduced from other areas which has become established in and more or less adapted to a given region by long-continued growth there.

Natural Recovery/Natural Revegetation

Natural re-establishment of plants on disturbed land. Relies on revegetation from the topsoil (seedbank) or invasion from adjacent lands. May be combined with straw crimping or planting of annuals to provide erosion control.

Natural Seeding (volunteer)

Natural distribution of seed over an area.

Neutron Probe *Gamma Probe*

A radioactive instrument for measuring soil water content indirectly through measurement of the slowing or thermalization of neutrons by hydrogen nuclei.

Nitrogen Fixation *Legume/Rhizobia*

The conversion of elemental nitrogen to forms that allow for ready uptake by plants.

No Observable Effect Concentration (NOEC) *LOEC*

The highest concentration of a contaminant used in a toxicity test that has no statistically significant adverse effect on the exposed population of test organisms relative to a control.

Noxious Weed *Nuisance Weed/Restricted Weed*

A designation in Alberta for weeds that have the ability to spread rapidly and cause severe crop losses and economic hardship. These weeds must be controlled to prevent further establishment and spread.

Nuisance Weed *Noxious Weed/Restricted Weed*

A designation in Alberta for weeds that are common to the Province. In many cases they are native species. They can be found on nearly all land throughout the Province, and as such are very difficult to eradicate. They can cause significant economic losses, but are so biologically suited that they cannot effectively be eradicated. Every attempt should be made to prevent the spread of nuisance weeds.

Nutrient *Essential Element/Macronutrient/Micronutrient*

A chemical that is an essential raw material for the growth and development of organisms.

Nutrient Limiting

The limitation of an organism or population growth or productivity, due to a limited supply of an essential nutrient. Productivity does not increase until the limiting nutrient is supplied.

O

Objective *Criteria/Guideline/Standard*

A numerical limit or narrative statement that has been established to protect and maintain a specified use of soil, water or land at a particular site by taking account site-specific conditions.

Oilfield Waste

An unwanted substance or mixture of substances that results from the construction, operation or reclamation of a wellsite, oil and gas battery, gas plant, compressor station, crude oil terminal, pipeline, gas gathering system, oil production site, or oilfield waste-related facility.

Oligotrophic *Eutrophic/Mesotrophic*

(1) designation for peatlands that are poor to extremely poor in nutrients and with low biological activity;
(2) containing a small amount of plant nutrients; refers to waters low in nutrient loading with low primary production of organic material by algae and/or macrophytes. Growth in an oligotrophic water is often limited by low levels of phosphorus and nitrogen.

Ombrotrophic

A supply of nutrients exclusively from rain water (including snow and atmospheric fallout), therefore making nutrition extremely oligotrophic often in an unbalanced way.

Open Pit Mine *Mine Dump/Strip Mine*

Refers to a procedure of mining that entails the complete removal of all material from over the product to be mined in a series of pits. Material from the pits may be cast into previous pits but is more often cast onto external spoil piles or dumps.

Operator (oil and gas)

The company or individual responsible for managing an exploration, development or production operation.

Order (soil) *Great Group*

A category in the Canadian System of Soil Classification. All the soils within an order have one or more characteristics in common.

Organic Carbon (soil)

The percent by weight of carbon in organic forms in soil materials, determined by the difference between total carbon (determined by dry combustion) and inorganic carbon (determined by acid dissolution).

Organic Matter

The organic fraction of the soil; includes plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by the soil population. It is usually determined on soils that have been sieved through a 2.0 mm sieve. It is estimated by multiplying the soil organic carbon content by 1.724.

Organic Soils *Brunisolic/Chernozemic/Gleysolic/Luvisolic/Organic Soils/Podzolic//Regosolic*

An order of soils that have developed dominantly from organic deposits. The majority of Organic soils are saturated for most of the year, unless artificially drained, but some of them are not usually saturated for more than a few days.

Includes the Fibrisol, Mesisol, Humisol, and Folisol great groups. They contain 17% or more organic carbon, and: (1) if the surface layer consists of fibric organic material and the bulk density is less than 0.1 Mg m^{-3} (with or without a mesic or humic Op less than 15 cm thick), the layer must extend to a depth of at least 60 cm; or (2) if the surface layer consists of organic material with a bulk density of 0.1 Mg m^{-3} or more, the organic material must extend to a depth of at least 40 cm; or (3) if a lithic contact occurs at a depth shallower than stated in (1) or (2) above, the organic material must extend to a depth of at least 10 cm.

Overburden

Materials of any nature, consolidated or unconsolidated, that overlie a deposit of useful materials.

Overstory Species *Understory Species*

A species that occurs within the tallest vegetation layer within a plant community. Most often trees.

Overstripping

The intentional stripping of the upper subsoil with the topsoil. This would only be done where incorporation of the upper subsoil would not significantly degrade the quality of the topsoil. This procedure may be suitable for areas with a shallow topsoil layer and good quality upper subsoil.

P

Pans *Hardpan*

Horizons or layers in soils that are strongly compacted, indurated or very high in clay content:
Caliche: A layer near the surface, more or less cemented by secondary carbonates of calcium or magnesium precipitated from the soil solution. It may be a soft, thin soil horizon, a hard thick bed just beneath the solum, or a surface layer exposed by erosion. It is not a geological deposit.
Claypan: A dense compact layer in the subsoil having a much higher clay content than the overlying material from which it is separated by a sharply defined boundary; usually hard when dry, and plastic and sticky when wet. It usually impedes the movement of water and air and the growth of plant roots. High clay content does not necessarily result in the formation of a claypan, as much depends on soil structure as well as texture.
Fragipan: A natural subsurface layer having a higher bulk density than the solum above; seemingly cemented when dry but showing moderate to weak brittleness when moist. The layer is low in organic matter, mottled, and slowly or very slowly permeable to water; it usually has some polygon-shaped bleached cracks. It is found in profiles of either cultivated or virgin soils but not in calcareous material.

Induced Pan: Also called pressure pan or traffic pan. A subsurface horizon or soil layer having a higher bulk density and a lower total porosity than the soil directly above or below it, as a result of pressure that has been applied by normal tillage operations or other artificial means. It is also referred to as plow pan, plow sole or traffic pan.

Parent Material

The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of a soil is developed by pedogenic processes.

Particle Size

The effective diameter of a particle measured by sedimentation, sieving, or micrometric methods.
Sand: a soil particle between 0.05 and 2.00 mm in diameter.
Silt: a soil separate consisting of particles between 0.05 and 0.002 mm in diameter.
Clay: a size fraction less than 0.002 mm in diameter.

Particle Size Distribution

The amount of the various soil separates in a soil sample, usually expressed as weight percentages.

Pasture *Rangeland*

An area devoted to the production of forage, introduced or native, and harvested by grazing.

Peat *Amorphous Peat/Brown Moss Peat/Forest Peat*

Material constituting peatlands, exclusive of the live plant cover, consisting largely of organic residues accumulated as a result of incomplete decomposition of dead plant constituents under conditions of excessive moisture (submergence in water and/or waterlogging).

Peatland *Bog/Muskeg*

A generic term including all types of peat-covered terrain.

Ped

A unit of soil structure such as a prism, block, or granule, formed by natural processes (in contrast to a clod, which is formed artificially).

Pedogenic

Pertaining to the mode of origin of the soil, especially the processes or soil-forming factors responsible for the development of the solum.

Pedon

A real unit of soil, the smallest homogenous, three-dimensional unit that can be considered a soil.

Penetrability

The ease with which a probe can be pushed into the soil. It may be expressed in units of distance, speed, force, or work, depending on the type of penetrometer used.

Penetration Resistance

The resistance of a soil to penetration. Varies with shape and kind of instrument used.

Penetrometer

A rod with specified size cone on its tip for measuring the resistance of a soil to penetration, giving an integrated index of soil compaction, moisture content, texture and type of clay mineral. The amount of penetration per unit force applied to a given soil will vary with the shape and kind of instrument used.

Perched Aquifer *Aquifer*

A localized unconfined aquifer formed above a relatively impermeable layer. May be seasonal due to recharge patterns and leakage through and flow around the restricting layer.

Perched Water Table

The water table of ground water separated from an underlying body of groundwater by unsaturated rock or impermeable layer of compacted soil.

Percolation *Infiltration*

The downward flow of water in saturated or nearly saturated soil.

Permeability (soil) *Impermeability*

The ease with which gases, liquids, or plant roots penetrate or pass through a bulk mass of soil or a layer of soil. Since different horizons of soil vary in permeability, the particular horizon under question should be designated.

Permeameter *Hydraulic Conductivity*

A device for confining a sample of soil or porous medium and subjecting it to fluid flow, in order to measure the hydraulic conductivity or intrinsic permeability of the soil or porous medium for the fluid.

Petroleum

A naturally occurring mixture of hydrocarbons in gaseous, liquid or solid form.

pH (soil) *Acid Soil/Alkaline Soil*

The negative logarithm of the hydrogen-ion activity of a soil. The degree of acidity (or alkalinity) of a soil as determined by means of glass, quinhydrone, or other suitable electrode or indicator at a specific moisture content of soil-water ratio, and expressed in terms of the pH scale.

Physical Properties (soil)

The characteristics, processes, or reactions of a soil that are caused by physical forces, and are described by, or expressed in, physical terms or equations. Sometimes physical properties are confused with and hard to separate from chemical properties; hence, the terms "physical-chemical" or "physicochemical." Examples of physical properties are bulk density, waterholding capacity, hydraulic conductivity, porosity, and poresize distribution.

Phytodegradation

The mineralization or metabolism of contaminants within plant tissue.

Phytoextraction *Bioaccumulation*

Uptake of a chemical by a plant.

Phytoremediation

The use of plants and their associated micro-organisms for the *in situ* treatment of contaminated soils.

Phytotoxicity

Toxicity in plants.

Phytovolatilization

The movement of a contaminant out of the soil into, through and out of a plant, and then into the atmosphere.

Piezometer

An instrument for measuring pressure head in a conduit, tank, soil, etc. It usually consists of a small pipe or tube tapped into the side of the container, connected with a manometer pressure gage, mercury or water column, or other device for indicating pressure head.

Pioneer Species *Climax Species*

Plant species that initially invade a newly exposed surface.

Pipeline *Flow Line*

(1) A pipe for the transmission of any substance and installations in connection with that pipe,
(2) A sewer or sewage system and installations in connection with that sewer or sewage system, or
(3) An underground pipe that contains telecommunication lines. (Regulatory definition)

Pit *Mine/Quarry/Borrow Excavation*

An excavation in the surface made for the purpose of removing, opening up, or proving sand, gravel, clay, marl, peat, or any other substance, and includes any associated infrastructure, but does not include a mine, quarry or borrow excavation. (Regulatory definition)

Plastic Limit *Atterberg Limits/Liquid Limit/Shrinkage Limit*

The plastic limit of soils is the moisture content at which the soil changes from a semisolid to a plastic state.

Plasticity Index *Shrinkage Index*

The numerical difference between the liquid limit and the plastic limit.

Podzolic *Brunisolic/Chernozemic/Gleysolic/Luvisolic/Organic Soils/Regosolic/Solenetzic*

An order of soils having podzolic B horizons (Bh, Bhf, Bf) in which amorphous combinations of organic matter (dominantly fulvic acid) Al, and usually Fe are accumulated. The sola are acid and the B horizons have a high pH-dependent charge. The great groups in the order are Humic Podzol, Ferro-Humic Podzol, and Humo-Ferric Podzol.

Pore Space

Spaces between soil particles in a volume of soil.

Porosity *Air Porosity*

The volume percentage of the total bulk not occupied by solid particles.

The ratio of volume of voids in a soil mass to the total volume of the mass.

Precision *Accuracy*

The closeness of repeated measurements of the same quantity.

Preplanning

Process of foreseeing reclamation problems and determining measures to minimize off-site damages.

Presence-absence *Abundance-Dominance*

Manner of completing a vegetation survey or analysis based on the presence or absence of a species instead of abundance-dominance.

Productive Soil

A soil in which the chemical, physical and biological conditions are favourable for the production of crops suited to a particular area.

Productivity (land) *Capability (land)*

The physical yield expected from a land unit assuming specified management practices and input levels.

Productivity (soil) *Capability Class (soil)*

The capacity of a soil, in its normal environment, for producing a specified plant or sequence of plants under a specified system of management. The "specified" limitations are needed because no soil can produce all crops with equal success and a single system of management cannot produce the same effect on all soils. Productivity emphasizes the capacity of the soil to produce crops and is expressed in terms of yield.

Profile (soil) *Control Section*

A vertical section of the soil through all its horizons and extending into the parent material.

Propagule

A part of a plant that implants a new individual.

Psychrometer

An instrument for determining atmospheric humidity by the reading of two thermometers, the bulb of one being kept moist and ventilated.

Pure Live Seed (PLS)

PLS = %germination x %purity. Seeding rates based on Pure Live Seed (PLS) compensate for the purity and germination frequency of the seed.

Q

Quarry *Mine/Pit*

Any opening in, excavation in, or working of the surface or subsurface for the purpose of working, recovering, opening up or proving ammonite shell or any mineral other than coal, a coal bearing substance, oil sands, or an oil sands bearing substance, and includes any associated infrastructure. (Regulatory definition)

R

Range Land *Pasture*

Land where the potential natural vegetation is predominantly grasses, grass-like plants, forbs, or shrubs, where natural herbivory was an important influence in its pre-civilization state, and that is more suitable for management by ecological rather than agronomic principles.

Rare Species *Common Species*

A species not widely distributed not easily found within a given area. Rare species include but are not necessarily limited to endangered, threatened or vulnerable species.

Recharge

Process by which water is absorbed and added to the zone of saturation.

Reclamation *Rehabilitation/Restoration*

The process of reconverting disturbed land to its former or other productive uses.

All practicable and reasonable methods of designing and conducting an activity to ensure:
(1) stable, non-hazardous, non erodible, favourably drained soil conditions, and
(2) equivalent land capability.

(1) The removal of equipment or buildings or other structures and appurtenances,
(2) The decontamination of buildings or other structures or other appurtenances, or land or water,
(3) The stabilization, contouring, maintenance, conditioning or reconstruction of the surface of land,
(4) Any other procedure, operation or requirement specified in the regulations. (Regulatory definition)

Reconnaissance

A level of field analysis that involves relatively quick sampling for the purpose of obtaining general information about an area. In some cases, sampling quality may be high, but the intensity of sampling is very low relative to the size of the total area being studied.

Reconstructed Profile *Minesoil*

The result of selective placement of suitable overburden material on reshaped spoils.

Reforestation *Afforestation*

The natural or artificial restocking of an area with forest trees.

Refugia

A stand of undisturbed natural vegetation retained within a mine development area that serves as a source of native species for revegetation.

Regolith

The unconsolidated mantle of weathered rock and soil material overlying solid rock.

Unconsolidated overburden that lies above bedrock. It includes glacial drift and colluvial and fluvial deposits that occur below the premine soil but does not include soft (paralithic) weathered-in-place bedrock.

Regosolic *Brunisolic/Chernozemic/Gleysolic/Luvisolic/Organic Soils/Podzolic/Solenetzic*

An order of soils having no horizon development or development of the A and B horizons insufficient to meet the requirements of the other orders.

Rehabilitation *Reclamation/Restoration*

Implies that the land will be returned to a form and productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.

Reject

Unwanted material separated from the desired product (e.g., the stone or dirt discarded from a coal preparation plant) and wasted.

Relative Hydraulic Conductivity *Hydraulic Conductivity*

The ratio of hydraulic conductivity of a given soil at a certain moisture content with the hydraulic conductivity of the same soil in saturated conditions.

Relief

The difference in elevation between the high and low points of a land surface.

Remediation *Decontamination*

The removal, reduction, or neutralization of substances, wastes or hazardous material from a site so as to prevent or minimize any adverse effects on the environment now or in the future.

Residence Time *Flushing*

Average time spent by a parcel of water in a basin (e.g., a wetland) before being discharged.

Residual Herbicide *Soil Sterilant*

A herbicide that can control weeds for long periods of time after it is applied.

Residual Material

Unconsolidated and partly weathered mineral materials accumulated by disintegration of consolidated rock in place.

Restoration *Reclamation/Rehabilitation*

The process of restoring site conditions as they were before the land disturbance.

Restricted Weed *Noxious Weed/Nuisance Weed*

A designation in Alberta for weeds that pose a serious threat, and as such must be eradicated. Generally these weeds possess characteristics of rapid spread, and superior competition.

Revegetation

The establishment of vegetation that replaces original ground cover following land disturbance.

Rhizobia *Legume/Nitrogen Fixation*

Small heterotrophic bacteria of the genus *Rhizobium* that fix atmospheric nitrogen through the use of nodules on the roots of leguminous plants.

Rhizome

(1) An elongated, usually underground, horizontal or ascending root-like stem.
(2) A rootstock.

Rhizosphere *Root Zone*

The soil surrounding and directly influenced by plant roots.

The micro-environment of the roots.

Rhizosphere Effect

The direct effect of plant roots and their exudates on microorganisms, including the fact that microbial populations are usually larger within the rhizosphere than in the root-free soil.

Right-of-Way

An easement in lands belonging to others that is obtained by agreement or lawful appropriation for public or private use.

The right of passage or of crossing over someone else's land.

Rill *Gully Erosion*

A narrow, very shallow, intermittent watercourse having steep sides. It presents no obstacle to tilling.

Riparian

Refers to terrain, vegetation or simply a position adjacent to or associated with a stream, flood plain, or standing waterbody.

Ripping *Chiseling/Subsoiling*

The act of breaking, with a tractor-drawn ripper or long angled steel tooth, compacted soils or rock into pieces small enough to be excavated or moved by other equipment as a scraper or dozer.

A tillage operation used to break up plough pans or other impermeable layers. Often a chisel is used to break up the soil to a depth of half a meter and at spacings of one meter. Ripping will also improve infiltration and percolation of water into the soil and thus improve vegetative growth.

Rip Rap

Broken rock, cobbles, or boulders placed on earth surfaces, such as the face of a dam, bank of a stream or lining drainage channels, for protection against the action of water.

Risk *Acceptable Risk*

A measure of both the hazard to health from exposure to a substance and the probability of its occurrence. It may involve quantitative extrapolation from animals to humans or from high dose/short time to low dose/long time. It may consider potency (physical/chemical properties, biological reactivity), susceptibility (metabolic activation, repair mechanisms, age, sex, hormonal factors, immunological status), level of exposure (sources, concentration, initiating events, routes, pathways), and adverse health effects (nature, severity, onset, reversibility).

Risk Analysis

The process of hazard identification and risk estimation. In addition to the qualitative aspects of hazard identification, risk analysis includes a quantitative description of risk based on risk assessment techniques.

Risk Assessment

Risk analysis and option evaluation. In addition to the scientific considerations involved in risk analysis, risk assessment includes consideration of such factors as risk acceptability, public perception of risk, socio-economic impacts, benefits, and technical feasibility. It forms the basis for risk management.

Risk Assessment (epidemiological)

Risk assessment focussing on the study of the distribution of, and determining factors for, illness or disease in humans.

Risk Assessment (toxicological)

Risk assessment focussing on the study of a suspected causative agent and predicting the potential for illness and disease based on assumptions of human exposure and toxicity.

Risk Communication

The two-way educational process between those who have assessed the dimensions of a risk and the potentially affected parties. If successful, this process should allow the knowledge gained from risk assessment to be translated into effective risk management.

Risk Estimation

Determination of the hazard and probability of occurrence of that hazard. It involves statistical analysis of toxicological and epidemiological data and of the level of human exposure. It examines the severity, extent, and distribution of the effects of an event or activity and leads to a specific numerical point estimate or a range of values.

Risk Management

The selection and implementation of a strategy for control of a risk, followed by monitoring and evaluation of the effectiveness of that strategy. The decision to select a particular strategy may involve consideration of the information obtained during risk assessment. Implementation may involve a commitment of resources and communication with affected parties. Monitoring and evaluation may utilize such techniques as environmental sampling, post-market surveillance, prospective epidemiology, and analysis of new health risk information, as well as efforts to ensure compliance with the decision.

Risk Perception

An impression or intuitive judgement about the nature and magnitude of a health risk. Perceptions of risk involve the judgements people make when they are asked to characterize and evaluate hazardous substances and activities.

Root Zone (rootzone) *Rhizosphere*

The part of the soil that is penetrated or can be penetrated by plant roots.

Runoff *Infiltration*

The portion of the total precipitation on an area that flows away through stream channels. Surface runoff does not enter the soil. Groundwater runoff or seepage flow from groundwater enters the soil before reaching the stream.

S

Safety *Acceptable Risk*

An acceptable degree of risk. Because acceptability is fundamentally a judgement value, determination of safety will always be subject to the values of the individual.

Saline-Alkali Soil (Saline-Sodic Soil)

(1) A soil containing enough exchangeable sodium to interfere with the growth of most crop plants, and containing appreciable quantities of soluble salts. The exchangeable-sodium percentage is greater than 15, the conductivity of the saturation extract is greater than 4 dS/m at 25°C, and the pH is usually 8.5 or less in the saturated soil.

(2) A saline-alkali soil has a combination of harmful quantities of salts and either a high alkalinity or high content of exchangeable sodium, or both, so distributed in the profile that the growth of most crop plants is reduced.

Saline Soil

A non-alkali soil containing soluble salts in such quantities that they interfere with the growth of most crop plants. The conductivity of the saturation extract is greater than 4 dS/m, the exchangeable-sodium percentage is less than 15, and the pH is usually less than 8.5.

State in soil caused by the presence of soluble salt (ions such as Na, Ca, K, Mg, Cl, SO_4) yielding an electrical conductivity of at least 2 dS/m.

Salinization

The process of accumulation of salts in soils.

Salt-Affected Soil

Soil that has been adversely modified for the growth of most crop plants by the presence of certain types of exchangeable ions or of soluble salts. It includes soils having an excess of salts, or an excess of exchangeable sodium, or both.

Sand *Clay/Particle Size/Silt*

A soil particle between 0.05 and 2.0 mm in diameter.

Saturated Hydraulic Conductivity *Hydraulic Conductivity/Relative Hydraulic Conductivity*

Hydraulic conductivity of a saturated soil with respect to water.

Saturation Percentage *Moisture Content*

Percent of the void volume in soil that is filled by water. Same as moisture content expressed in terms of percent.

Scarification (seed) *Stratification*

The artificial breakdown of the outer seed coat by mechanical or chemical means. These methods are used to improve germination frequency.

Scarification (soil)

Seedbed preparation to make a site more amenable to plant growth.

Sedge Peat *Brown Moss Peat/Forest Peat/Sedimentary Peat/Sphagnum Peat*

Peat composed mostly of the stalks, leaves, rhizomes, and roots of sedges (*Carex* spp.).

Sediment

Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its surface of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Basin

A reservoir for the confinement and retention of silt, gravel, rock, or other debris from a sediment-producing area.

Sedimentary Peat *Brown Moss Peat/Forest Peat/Sedge Peat/Sphagnum Peat*

A material composed of plant debris and faecal pellets less than a few tenths of a millimetre in diameter and having brown or gray-brown colours when dry. It has slightly viscous water suspensions, is slightly plastic but not sticky, and shrinks upon drying to form clods that are difficult to rewet. It has few or no plant fragments recognizable to the naked eye.

Seedbed

The soil prepared by natural or artificial means to promote the germination of seed and the growth of seedlings.

Seepage

(1) The slow flow of water into or from a soil. Seepage usually involves the lateral flow of water.
(2) The emergence of water from the soil over an extensive area in contrast to a spring where it emerges from a local spot.

Seral Community *Climax Community*

One of a sequence of communities in the development stages towards a climax community.

Shear Strength

The maximum internal resistance of a soil to the movement of its particles; that is, resistance to slipping or sliding of soil over soil. The forces that resist shear are internal or intergranular friction and cohesion.

Short-term Exposure *Dose/Exposure/Long-term Exposure*

An exposure to a contaminant in a medium lasting a short time and usually severe enough to rapidly induce an effect. Often referred to as an acute exposure. Absolute definitions for this term vary from study to study.

Shrinkage Index *Plasticity Index*

The numerical difference between the plastic and the shrinkage limits.

Shrinkage Limit *Atterberg Limits/Liquid Limit/Plastic Limit*

The maximum water content at which a reduction in the water content will not cause a decrease in the volume of the soil mass; this defines the arbitrary limit between the solid and semi-solid states.

Shrub

A woody perennial plant differing from a tree by its low stature and by generally producing several basal shoots instead of a single trunk.

Siemen *Electrical Conductivity*

A unit of electrical conductance, the reciprocal ohm; the decisiemen (dS), one-hundredth of a siemen, is the preferred term in soil sciences.

Silt *Clay/Particle Size/Sand*

A soil separate consisting of particles between 0.05 to 0.002 mm in equivalent diameter.

Silvic *Forest Peat*

Pertaining to organic soils developed in forest peat; used in describing organic soil families.

Site Index

An expression of forest site quality based on the height of dominant and codominant trees at a specific age.

Slaking

The crumbling and disintegration of earth materials when exposed to air or moisture. More specifically, the breaking up of dried clay when saturated with water, due either to compression of entrapped air by inwardly migrating capillary water or the progressive swelling and sloughing off of the outer layers.

Slash

Debris left as a result of tree clearing. Includes materials such as logs, splinters, chips, branches and tops, uprooted stumps, and broken or uprooted trees and shrubs.

Slope

The degree of deviation of a surface from horizontal, measured in a numerical ratio, percent, or degrees. Expressed as a ratio or percentage, the first number is the vertical distance (rise) and the second is the horizontal distance (run), as 2:1 or 200 percent. Expressed in degrees, it is the angle of the slope from the horizontal plane with a 90° slope being vertical (maximum) and 45° being a 1:1 slope.

Slough

A Western Canadian term for a shallow prairie pond that largely disappears in late summer, often with a muddy bottom.

Sodic Bedrock

Unconsolidated sedimentary rock (bentonitic shales, clayey sandstones) also referred to as soft rock or residual materials, of marine origin containing sufficient exchangeable sodium to interfere with the growth of most crop plants and also containing appreciable quantities of soluble salts. The SAR is greater than 15. Sodic bedrock also has high saturation percent values and water supply problems and poor structural (aggregation) properties.

Sodicity

A measure of the amount of sodium on the exchange complex (often expressed as sodium adsorption ratio - SAR).

Sodic Soil

A soil containing sufficient exchangeable sodium to interfere with the growth of most crop plants. SAR of the saturation paste extract is greater than 15.

Soil

(1) The unconsolidated material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

(2) The naturally occurring unconsolidated material on the surface of the earth that has been influenced by parent material, climate (including the effects of moisture and temperature), macro- and micro-organisms, and relief, all acting over a period of time to produce soil that may differ from the material from which it was derived in many physical, chemical, mineralogical, biological, and morphological properties.

(3) For the purpose of the Canadian taxonomic system, the earth's surface (the material that is to be classified) is divided into soil and nonsoil. Soil is the naturally occurring, unconsolidated, mineral or organic material at the earth's surface that is capable of supporting plant growth. It extends from the surface to 15 cm (6 inches) below the depth at which properties produced by soil-forming processes can be detected. These properties differ from those found in any underlying unconsolidated material. The soil-forming processes are defined as an interaction between climate, living organisms, and relief acting on soil and soil parent material. Unconsolidated material includes material cemented or compacted by soil-forming processes. Soil may have water covering its surface to a depth of 60 cm (24 inches) or less in the driest part of the year. Nonsoil is the collection of soil material or soil-like material that does not meet the preceding definition of soil. It includes soil displaced by un-natural processes and unconsolidated material unaffected by soil-forming processes, except for the material that occurs within 15 cm (6 inches) below soil as defined. Nonsoil also includes unconsolidated mineral or organic material thinner than 10 cm (4 inches) overlying bedrock; organic material thinner than 40 cm (16 inches) overlying a hydric layer; and soil covered by more then 60 cm (24 inches) of water in the driest part of the year.

Soil Classification

The systematic arrangement of soils into categories and classes on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties.

Soil Complex

A mapping unit used in detailed and reconnaissance soil surveys where two or more defined soil units are so intimately intermixed geographically that is it impractical, because of the scale used, to separate them.

Soil Correlation Area

A mapping of soils within Alberta that places greater emphasis on local ecological, climatic, and topographical differences between areas.

Soil Horizon *A Horizon/B Horizon/C Horizon*

A layer of soil or soil material approximately parallel to the land surface distinguishable from adjacent layers by colour, structure, consistence, chemical, biological, and mineralogical composition.

Soil Improvement

Increasing a soil's capability to sustain plant growth by drainage and irrigation, or through the addition of various soil amendments such as fertilizers.

Soil Management

The sum total of all tillage operations, cropping practices, fertilizer, lime and other treatments conducted on or applied to a soil for the production of plants.

Soil Map

A map showing the distribution of soil types or other soil mapping units in relation to the prominent physical and cultural features of the earth's surface. There are five kinds of soil maps recognized: (1) detailed; (2) detailed reconnaissance; (3) generalized; (4) reconnaissance; and, (5) schematic.

Soil Map Delineation

A single soil area or polygon on a soil map which is differentiated from other areas on the basis of soil and landscape features.

Soil Map Unit

A defined and named repetitive grouping of soil bodies occurring together in an individual and natural characteristic pattern over the soil landscape. The attributes of a map unit vary within more or less narrow limits that are determined by the intensity of the survey. A map unit comprises all the map delineations that have the same name. A map unit is conceptual; a map delineation is real.

Soil Pores

The part of the bulk volume of soil not occupied by soil particles.

Soil Series

The basic unit of soil classification in the Canadian System of Soil Classification consists of soils that are essentially alike in all major profile characteristics except the texture of the surface.

Soil Solution

The aqueous liquid phase of the soil and its solutes consisting of ions dissociated from the surfaces of the soil particles and of other soluble materials.

Soil Sterilant *Residual Herbicide*

Any substance that renders soil incapable of supporting plant growth in either the short term or the long term.

Soil Structure

The combination or arrangement of primary soil particles into secondary particles, units, or peds. The secondary units are characterized and classified on the basis of size, shape, and degree of distinctness into classes, types and grades.
Structural units include:

Blocky: Cubelike blocks of soil up to 10 cm in size, sometimes angular with well-defined planar faces, sometimes with curved surfaces and corners (subangular blocky)
Columnar: Vertically oriented pillars, often six-sided, up to 15 cm in diameter with rounded tops. Such structures are common in the B horizon of clayey soils, particularly in semiarid regions.
Granular: Rounded aggregates, generally not much larger than 2 cm in diameter, often found in a loose condition in the A horizon. Where particularly porous, such units are called crumbs.
Platy: Horizontally layered, thin and flat aggregates resembling wafers. Such structures occur, for example, in recently deposited clay soils.
Prismatic: Vertically oriented pillars, often six-sided, up to 15 cm in diameter, with flat tops to the pillars; common in the B horizon of clayey soils in semiarid regions.

Soil Survey

A general term for the systematic examination of soils in the field and in the laboratory, their description and classification, the mapping of kinds of soil, and the interpretation of soils for many uses, including their suitabilities or limitations for growing various crops, grasses and trees, or for various engineering uses and predicting their behaviour under different management systems.

Soil Texture

The relative proportions of sand, silt or clay contained in a soil sample.

Soil Type

A unit in the natural system of soil classification; a subdivision of a soil series consisting of or describing soils that are alike in all characteristics including the texture of the A horizon.

Solidification (drilling wastes)

Process which chemically and/or physically changes a fluid (liquid or gas) into a solid.

Solifluction

The flow of saturated soil downslope over rock or frozen ground, and the subsequent sorting of the debris on level ground, especially under conditions of alternate freezing and thawing.

Solifluction Lobe

Tongue-like mass of solifluction debris commonly with steep fronts and a relatively gentle upper surface.

Solonetzic *Brunisolic/Chernozemic/Gleysolic/Luvisolic/Organic Soils/Regosolic*

An order of soils developed mainly under grass or grass-forest vegetative cover in semiarid to subhumid climates. The soils have a stained brownish or blackish solonetzic B (Bn, Bnt) horizon and a saline C horizon. The order includes the Solonetz, Solodized Solonetz and Solod great groups.

Solum

The upper horizons of a soil in which the parent material has been modified and in which most plant roots are contained. It usually consists of the A and B horizons.

Sorptivity

Sorptivity is the slope of the straight line portion of the curve relating accumulated infiltration to the square root of time.

Sphagnic

Pertaining to Organic soils developed in peat derived mainly from Sphagnum spp.; used in describing organic soil families

Sphagnum Peat *Brown Peat/Forest Peat/Sedge Peat/Sedimentary Peat*

Peat consisting mainly of *Sphagnum* spp.; usually poorly decomposed and raw; may also contain *Eriophorum* spp., *Carex* spp., and ericaceous species.

Spoil *Mine Dump*

(1) The overburden or non-ore material removed in gaining access to the ore or mineral material in surface mining.
(2) Debris or waste material from a mine.

Spoil Pile

A pile of spoiled overburden.

Stability

The resistance of a structure, spoil heap, or a clay bank to sliding, overturning or collapsing. A structure is only as stable as its foundations and those in turn upon the soil or rock on which they are constructed. Soil stability, such as mountain slopes, spoil heaps, and embankments, depends on the shearing strength of the material and that is a function of internal strength and cohesion.

Stabilization

Chemical or mechanical treatment designed to increase or maintain the stability of a mass of soil or otherwise to improve its engineering properties.

Stand

A collection of plants having a relatively uniform composition and structure, and age in the case of forests.

Standard *Criteria/Objective*

A legally enforceable numerical limit or narrative statement, such as in a regulation, statute, contract or other legally binding document, which has been adopted from a criterion or objective.

Standard Soil Handling Procedure (pipeline) *Three-Lift*

Topsoil is selectively removed in one lift and spoil material is removed in a second lift. Following pipe installation, the topsoil and subsoil materials are replaced in their pre-construction order and depth. (May also be called Two-Lift).

Standing Crop

The amount of biomass that occurs on a given site at a particular time without reference to rate of accumulation.

Stratification *Scarification (seed)*

The breaking of seed dormancy by exposing the seed to prolonged or repeated freezing under moist conditions. However, alternating warm and cold stratification methods are also frequently used. These methods are used to improve germination frequency.

Strip Mine *Open Pit Mine*

Refers to a procedure of mining that entails the complete removal of all material from over the product to be mined in a series of rows or strips. Material from one strip is cast into the previous strip allowing for sequential reclamation.

Stubble Mulch *Crop Residue*

The stubble of crops or crop residues left essentially in place on the land, providing a protective surface cover before and during the preparation of the seedbed and at least partially during the growing of a succeeding crop.

Sublethal

Involving a stimulus/concentration below the level that causes death. Exposure to sublethal concentrations of a material may produce less obvious effects on behaviour, biochemical and/or physiological function and histology of organisms.

Subsidence

A lowering of the soil surface due to a reduction in volume through settling or other means.

Subsoil

The soil material found beneath the topsoil but above the bedrock.

Technically, the B horizon; broadly, the part of the profile below plough depth.

Subsoiling *Chiseling/Ripping*

The breaking of compact subsoils, without inverting them, with a special knifelike instrument (chisel), which is pulled through the soil usually at depths of 30 to 60 cm (12 to 24 inches) and spacings of 60 to 150 cm (2 to 5 feet).

The tillage of subsurface soil, without inversion, for the purpose of breaking up dense layers that restrict water movement and root penetration.

Succession

The natural sequence or evolution of plant communities, each stage dependent on the preceding one, and on environmental and management factors. **Primary succession** occurs on newly created surfaces, while **secondary succession** involves the development or replacement of one stable successional species by another on a site having a developed soil. Secondary succession occurs on a site after a disturbance (fire, cutting, etc.) in existing communities.

Suitability

A term used in land evaluation to indicate the appropriateness of a site to support a proposed activity or attribute; usually a relative scale is used to gage suitability such as high, moderate, low, or not suitable.

Surface Sealing

The orientation and packing of dispersed soil particles in the immediate surface layer of the soil to render the surface fairly impermeable to water.

Surface Soil *Coversoil/Topsoil*

The undisturbed soil profile, made up of any or all of the litter layer, and A, B, and BC horizons, or organic horizons (including deep peat deposits), that is salvaged for use in reclamation.

The uppermost part of the soil that is ordinarily moved in tillage, or its equivalent in uncultivated soils. It ranges in depth from 7.5 cm to 25 cm and is frequently designated as the "plow layer", the "Ap layer", or the "Ap horizon".

Suspended Solids

Organic or inorganic particles that are suspended in and carried by water. The term includes sand, silt and clay particles as well as solids in wastewater. Measured as the oven dry weight of the solids, in ppm, after filtration through a standard filter paper. Less than 25 ppm would be considered a clean water, while an extremely muddy river might have about 200 ppm of suspended solids.

Suspension *Abandonment*

The cessation of normal production or operation of a facility or site. The facility or site need not be rendered permanently incapable of its use, but is left in a safe and stable state during the suspension period.

Sustainability *Conservation*

The process of managing biological resources (e.g., timber, fish) to ensure replacement by regrowth or reproduction of the part harvested before another harvest occurs.

Sustainable Landscape

Landscape that can survive extreme events and natural cycles of change without being subjected to accelerated erosion or environmental impacts more severe than those of the natural environment.

Sustained Yield *Productivity*

A continual annual, or periodic, yield of plants or plant material from an area; implies management practices that maintain the productive capacity of the land.

Swamp

A peat-filled area or a mineral wetland with standing or gently flowing waters occurring in pools and channels. The water table is usually at or near the surface. There is strong water movement from margin or other sources, hence the waters are nutrient-rich. If peat is present, it is mainly well decomposed forest peat underlain at times by fen peat. The associated soils are Mesisols, Humisols, and Gleysols. The vegetation is characterized by a dense cover of coniferous or deciduous trees, tall shrubs, herbs, and some mosses.

Sweet Oil and Gas

Petroleum containing little or no hydrogen sulphide.

T

Tailings *Fine Tailings*

Mineral refuse from a milling operation usually deposited from a water medium.

Talus *Colluvial Slope/Highwall*

A sloping heap of loose rock fragments lying at the foot of a cliff or steep slope.

Tensiometer

A device for measuring the negative pressure, or tension, of water in soil in situ; a porous, permeable ceramic cup connected through a tube to a manometer or vacuum gauge.

Terrace

A nearly level, somewhat narrow plain, existing naturally along rivers, lakes or seas or created artificially to reduce erosion by overland runoff.

Terric

Unconsolidated mineral soil.

Terric Layer

An unconsolidated mineral substratum underlying organic soil material.

Texture Triangle

Diagram depicting texture class in relation to the percentage of sand, silt, and clay.

Thermal Cover

Cover that is used by ungulates to help regulate their body temperatures during extreme ambient temperatures. These areas of forest, generally softwood, are more mature than those that make up the escape cover.

Thermal Desorption

A thermal treatment process that applies a heat source to a waste material to evaporate or volatilize contaminants from the waste material. Contaminant vapours are then incinerated in an oxidizing unit.

Thermal Distillation Recovery

A thermal treatment process that applies a heat source to a waste material to evaporate or volatilize the contaminants. Contaminant vapours are then cooled, condensed, and collected. Collected liquids may then be separated into oil and water phases.

Three-Lift (pipelines) *Standard Soil Handling Procedure*

A soil handling procedure whereby the soil is selectively removed, stored, and replaced in three layers: topsoil, upper subsoil, and lower subsoil.

Tile Drain

Pipe placed at suitable depths and spacings in the soil or subsoil to provide water outlets from the soil. The pipe may be concrete, ceramic, fibre, plastic, or any other suitable material.

Till

An unstratified, non-sorted deposit of gravel, boulders, sand and finer materials which has been transported by a glacier.

Tillage

Any mechanical manipulation of soil that changes its structure, strength or position in order to improve conditions for crop production. The four primary aims of tillage are generally: control of weeds, incorporation of organic matter into the soil, improvement of soil structure to improve soil-water and soil-air relations, and to provide a seedbed.

Tilth

The physical condition of a soil as related to its ease of tillage, fitness as a seedbed, and impedance to seedling emergence.

Tolerable Daily Intake (TDI) *Dose/Estimated Daily Intake*

For a non-carcinogen, the daily human dose expected to pose no significant risk to the average person.

Topography

The shape of the ground surface, such as hills, mountains, or plains. Steep topography indicates steep slopes or hilly land; flat topography indicates flat land with minor undulations and gentle slopes.

Topsoil *Surface Soil*

(1) The layer of soil moved in cultivation.
(2) The A horizon.
(3) The Ah horizon.
(4) Presumably fertile soil material used to topdress roadbanks, gardens, and lawns.

The uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils, and normally ranging in depth from 5 cm to 45 cm.

Trace Element *Micronutrient*

Chemical element present in a minor amount in water or soil.

Trafficability

The ability of the ground surface to support vehicular traffic.

Transect

A sampling system that involves the measurement or recording of data along a line. The line intercept method involves measurements of objects that occur beneath the line, while in other cases, small sampling plots are located along the line at specified distances. Individual measures from a line transect are combined to create a single set of data, e.g. average percent cover.

Transpiration

Process by which water from vegetation is transferred into the atmosphere in the form of vapour.

Trenching (drilling wastes)

A back-hoe is used to construct deep, narrow trenches, confined to the lease area. Liquids or solids are squeezed out of the sump as stockpiled soils are slowly introduced into the sump to displace contained liquids or solids which flood into the trenches. Soil excavated from the next trench is cast on top of the material in the active trench resulting in dilution and stabilization.

Trophic Level

Position in the food chain determined by the number of energy transfer steps to that level.

Trophic Status *Eutrophic /Mesotrophic/ Oligotrophic*

Nutrient status; availability of nutrients to plants.

TZ Test

A test used to determine the germinating potential of seed. Tetrazolium chloride, a soluble salt, reacts with living tissue, staining it various colours.

U

Uncertainty Factor

A unitless numerical value that is applied to a reference toxicological value (e.g., EC_{50}) to account for the uncertainty in the estimate of a final soil quality criterion. Uncertainty factors may be applied, for example, when there is a need for extrapolation to long-term values from short-term data, extrapolation from laboratory to field conditions, or to account for inter- or intra-specific variation between individual test organisms and species.

Understory Species *Overstory Species*

A species found in one of the lower vegetation layers within a plant community. Commonly shrub, grass or moss.

Unsaturated Zone

The zone above the water table in an aquifer; the vadose zone.

Upper Subsoil *Lower Subsoil*

The soil material found immediately below the topsoil. (For use in pipeline three-lift planning).

Upstream Sector *Downstream Sector*

The oil and natural gas industry has two main components, the upstream producing sector and the downstream refining and marketing sector. The upstream sector includes exploration and production companies as well as hundreds of associated businesses such as seismic and drilling contractors, service rig operators, engineering firms and various scientific, technical, service and supply companies.

V

Veneer

A mantle of unconsolidated materials too thin to mask the minor irregularities of the underlying unit surface. A veneer will generally be less than 1 m in thickness.

Void Ratio

The ratio of the volume of pores to the volume of the solids.

Volatilization

Transfer of a chemical into the atmosphere as a gas or vapour.

von Post Humification Scale *Peat*

Scale describing peat moss in varying stages of decomposition ranging from H1, which is completely unconverted, to H10, which is completely converted.

W

Warm Season Plants *Cool Season Plants*

Plants, mostly of tropical origins, completing the major portion of their growth during the mid- to late-summer months. Their physiology demands full sunlight and warmer temperatures.

Waste Treatment

Any method, technique, or process, including, without limitation, neutralization and stabilization, that is designed to change the physical, chemical and/or biological character or composition of a substance.

Water Content (Soil Moisture Tension)

The amount of water held in a soil, expressed on a weight or volume basis. Generally, gravimetric water contents are expressed relative to the oven-dry weight of soil.
Available Water: Generally that portion of soil water that can be readily absorbed by plant roots; as a specific soil moisture value, the mathematical difference in the amounts of water a soil holds at the field capacity and the permanent wilting point.

Field Capacity: The amount of water remaining in a soil after it has been saturated and then allowed to drain freely for one or two days. Usually expressed as a percentage in terms of weight or volume. Often estimated at -1/3 bar water potential.
Gravitational Water: Water that moves into, through, or out of the soil under the influence of gravity. The water between field capacity and saturation.
Hygroscopic Water: Water so tightly held by the attraction of soil particles that it cannot be removed except as a vapour, by raising the temperature above the boiling point of water. It is unavailable to plants and lies between permanent wilting point and oven dry.
Permanent Wilting Point: The water content of a soil at which plants wilt and fail to recover their turgidity when placed in a dark, humid atmosphere. The percentage of water at the wilting point approximates the minimum water content in soils under plants in the field at depths below the effects of surface evaporation. It is approximated by the soil water content at 15 bar tension.

Water-Holding Capacity

The ability of soil to hold water. The water-holding capacity of sandy soils is usually considered to be low while that of clayey soils is high.

Waterlogged

Saturated with water.

Water Retention

The relationship between matric potential and soil water content is represented graphically as the soil moisture characteristic curve or the soil water retention curve.

Watershed *Drainage Basin*

All lands enclosed by a continuos hydrologic-surface drainage divide and lying upslope from a specified point on a stream.

Watertable

Elevation at which the pressure in the water is zero with respect to the atmospheric pressure.

The upper limit of the soil or underlying rock material that is wholly saturated with water.

Weathering (soil)

The physical and chemical disintegration, alteration, and decomposition of rocks and minerals at or near the earth's surface by atmospheric agents.

Weathering (contaminants)

The selective reduction of easily-degradable contaminants in soil due to natural processes such as wind, sun, and rain.

Wetland

Land having the water table at, near, or above the land surface or which is saturated for long enough periods to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activity that are adapted to the wet environment. Wetlands include peatlands and areas that are influenced by excess water but which, for climatic, edaphic or biotic reasons, produce little or no peat. Shallow open water, generally less than 2 m deep, is also included in wetlands.

White Area *Green Area*

That part of Alberta that is not in the Green Area. (Regulatory Definition)

Wildcat Well

A well drilled in an area where no oil or gas production exists.

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Common Acronyms

Technical Terms

AVI - Alberta Vegetation Inventory
CEA - Cumulative Effects Assessment
CLI - Canada Land Inventory
CT - Consolidated or Composite Tailings (oil sands)
EC - Electrical Conductivity
EEM - Environmental Effects Monitoring
EIA - Environmental Impact Assessment
EPP - Environmental Protection Plan
ESP - Exchangeable Sodium Percentage
GIS - Geographic Information System
HRIA - Historical Resources Impact Assessment
KIR - Key Indicator Resources (used in EIAs; see also VEC)
LOC - Licence of Occupation (public lands)
MFT - Mature Fine Tailings (oil sands)
MLL - Miscellaneous Lease (public lands)
MSL - Mineral Surface Lease (public lands)
OM - Organic Matter (usually %OM)
PLA - Pipeline Agreement (public lands)
SAR - Sodium Adsorption Ratio
SEIA - Socio-Economic Impact Assessment
SQC - Soil Quality Criteria
TDS - Total Dissolved Solids
TFT - Thin Fine Tailings (oil sands)
TSS - Total Suspended Solids
VEC - Valued Ecosystem Components (used in EIAs; see also KIR)

Organizations, Committees, etc.

AEC - Alberta Environmental Centre (now part of the Alberta Research Council)
AENV - Alberta Environment
AEP - Alberta Environmental Protection (now Alberta Environment)
AFPA - Alberta Forest Products Association
AFRD - Alberta Agriculture, Food and Rural Development (formerly Alberta Agriculture)
AFS - Alberta Forest Service (now Land and Forest Service of AENV)
AOSTRA - Alberta Oil Sands Technology and Research Authority
APESC - Alberta Pipeline Environmental Steering Committee
APIGEC - Alberta Petroleum Industry/Government Environment Committee
ARC - Alberta Research Council
ARHCA - Alberta Roadbuilders and Heavy Construction Association
ASGA - Alberta Sand and Gravel Association
ASSMR - American Society for Surface Mining and Reclamation
CAC - The Coal Association of Canada
CAPP - The Canadian Association of Petroleum Producers
CCME - Canadian Council of Environment Ministers
CEAA - Canadian Environmental Assessment Act **or** Canadian Environmental Assessment Agency

CEATAG - CONRAD Environmental Aquatic Technical Advisory Group
CEPA - Canadian Energy Pipeline Association
CLRA - Canadian Land Reclamation Association
CONRAD - Canadian Oilsands Network for Research and Development
CRI - Conservation and Reclamation Inspector (formerly Reclamation Officer)
DFO - Department of Fisheries and Oceans (federal)
ESD - Environmental Sciences Division (part of Alberta Environment)
ESAA - Environmental Services Association of Alberta
EUB - Alberta Energy and Utilities Board (combined the ERCB and the Public Utilities Board)
FLW - Forestry, Lands and Wildlife (now part of AENV and AFRD)
LCRC - Land Conservation and Reclamation Council (the name no longer applies)
LRD - Land Reclamation Division (the Division no longer exists)
NRCB - Natural Resources Conservation Board
PSAC - Petroleum Services Association of Canada
PTAC - Petroleum Technology Alliance of Canada
RRTAC - Reclamation Research Technical Advisory Committee
SEPAC - Small Explorers and Producers Association of Canada

Legislation

ADR - *Activities Designation Regulation*
CEPA - *Canadian Environmental Protection Act*
CRR - *Conservation and Reclamation Regulation*
EPEA - *Environmental Protection and Enhancement Act*
OGCA - *Oil and Gas Conservation Act*
OSCA - *Oil Sands Conservation Act*
PLA - *Public Lands Act*
LSCRA - *Land Surface Conservation and Reclamation Act* (replaced by EPEA)
SRA - *Surface Reclamation Act* (replaced by LSCRA)